



Contents

JON C. LOVETT AND SIMON N. STUART. Avifauna and vegetation of the Shume <i>Juniperus</i> forest in the West Usambara mountains, Tanzania	1
GERHARD NIKOLAUS. Weights and fat scores of migrating and wintering Blackcaps <i>Sylvia atricapilla</i> in the Sudan.....	15
MORTON DEHN AND LARS CHRISTIANSEN. Additions to the known avifauna of the Rwenzori Mountains National Park in western Uganda	19
J.D. ROSSOUW. New records of uncommon and poorly known species for Ugandan National Parks and Forest Reserves	23
TOM S. ROMDAL. Altitudinal distribution and abundance patterns of bird species in the Eastern Arc Mountains, Tanzania	35

Short communications

P.W.P. BROWNE AND LYNETTE BROWNE. Probable Congo Bay Owl <i>Phodilus prigoginei</i> in Burundi	55
COLIN JACKSON, LEON A. BENNUN AND GÁBOR L. LÖVEI. Unusual behaviour of a White-naped Raven <i>Corvus albicollis</i> with its Superb Starling <i>Lamprotornis superbus</i> prey	56
D.A. EWBANK. Long-toed Plover <i>Vanellus crassirostris</i> foot-stirring	59
NORBERT J. CORDEIRO. Noteworthy Tanzanian bird records from the Field Museum of Natural History	60
R. GLEN AND S. STOLBERGER. Black-faced Red-billed Hornbills <i>Tockus erythrorhynchus</i> in Ruaha National Park, south-western Tanzania	62
R.J. SAFFORD. Use of clearings by Humblot's Flycatcher <i>Humblotia flavirostris</i>	64
RICHARD JENKINS. Observations on the White-throated Rail <i>Dryolimnas cuvieri</i> in Madagascar	65
Omission	67
Information requested	68

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Stuart, S.N., Jensen, F.P., Brøgger-Jensen, S. & Miller, R.I. 1993. The zoogeography of the montane forest avifauna of eastern Tanzania. Pp. 203–228 in Lovett, J.C. & Wasser, S.K. (eds) *Biogeography and ecology of the rainforests of Eastern Africa*. Cambridge: Cambridge University Press.

(continued on inside back cover)

An avifaunal survey of Mt Kulal, Kenya

Luca Borghesio and Paul Kariuki Ndang'ang'a

30 APR 2003

Mt Kulal, in northern Kenya, lies in one of the most arid and hostile parts of the country. Nonetheless there is a small area of montane forest on the mountain top, completely isolated from other forest patches (the nearest of these, on Mt Njiru, is some 55 km away across semi-desert). This forest constitutes an inland island, the only refuge of an endemic form of white-eye. This is treated by some authors as a subspecies of Montane White-eye *Zosterops poliogaster* (Dowsett & Dowsett-Lemaire 1993), and by others as a full species *Zosterops kulalensis* (Collar *et al.* 1994, BirdLife International 2000). A short report on Kulal's avifauna, unfortunately based on an incomplete and partly erroneous species list, was published by Moreau (1966). After this, the forest was visited briefly by Diamond & Keith (1980) in 1962 and 1979 and by some other observers whose records were included in the Bird Atlas of Kenya (Lewis & Pomeroy 1989). These data provided a good initial list of the bird species of the forest, estimated at 51–75% complete by Bennun & Waiyaki (1993). However, no clear information is available on the structure of the bird community, on its variation over time, and on its present conservation status (considered worrying by Diamond & Keith (1980), owing to the growing human pressure on the area).

We report the results of a survey carried out in 1997–98 that aimed to provide basic information on the avifauna of Mt Kulal, focusing especially on the forest habitat. These data form a basis for further comparisons with other East African forests.

The study site

Mt Kulal ($2^{\circ}43'N$ $36^{\circ}56'E$) is an extinct Pleistocene volcano in northern Kenya, east of the southern end of Lake Turkana (Figure 1). It rises steeply to an altitude of 2230 m. The surrounding area is mainly below 750 m, with sparse rainfall (between 200 and 300 mm/year). The upper part of the mountain enjoys a substantially wetter climate, with an average rainfall of 900–1000 mm/year (Bake 1983), allowing forest to develop. Based on the available 1:100,000 maps (Survey of Kenya, series Y633, sheet 41), the forest covers approximately 18 km^2 , divided into a larger southern section (c. 12 km^2) and a smaller northern one (6 km^2). The two sections of forest are separated by the remains of a crater and surrounded by a belt of drier bushland, bringing the total extent of evergreen vegetation on the mountain to about $30\text{--}40 \text{ km}^2$.

The area is inhabited by the Samburu people, nomadic pastoralists who usually enter the forest only to allow their animals to graze in the dry season. Apart from this, the forest is also exploited as a source of fuelwood and wild honey. Large mammals, such as African Elephant *Loxodonta africana* and Cape Buffalo *Synacerus caffer* were exterminated in the early 1970s.

We visited the area between 20 November and 17 December 1997 and between 13 and 28 October 1998. In 1997 we were based in the small village of Gatab, at an altitude of 1750 m on the southern slope of the mountain, from which only the southern part of the forest was accessible. In 1998 we spent eight days (13–20 October) at Gatab again. We then proceeded to Toora (2100 m), in the northern section of the forest, where we camped from 23–28 October.

The weather was very different in the two years. In 1997 the area was extremely wet, and temperatures lower than usual. By contrast, in 1998 there had been no rain since June, and almost none fell during our stay.

Our main aim was to survey the habitats above 1500 m of altitude, and especially the forest, which usually grows above 1800 m. The following habitat categories were recognised:

Forest: habitats with continuous or almost continuous canopy exceeding 8 m, dominated by trees (defined as woody plants of more than 3 m of height) with diameters at breast height of more than 5 cm, and usually a medium or low density of shrubs (vegetation of 1–3 m in height). Common tree species included *Cassipourea malosana*, *Olea hochstetteri*, *Xymalos monospora*, *Teclea simplicifolia* and *T. nobilis*. *Juniperus procera* and *Olea europaea* were also present, but usually in the outer and most disturbed parts of the forest.

Forest edge: habitats with a discontinuous canopy mostly lower than 8 m, with a high cover of shrubs. Trees were mostly of less than 5 cm in diameter. Common tree and shrub species were *Olea europaea*, *Juniperus procera*, *Pistacia aethiopica* and *Cadia purpurea*.

Wet bush: habitats with few or no trees, dominated by shrubs, with many evergreen species, usually at altitudes of 1500–1800 m. Common plant species were *Cadia purpurea*, *Acacia brevispica*, *Carissa edulis*, *Myrsine africana* and *Euclea* spp.

Dry bush: usually at altitudes lower than 1600 m, with several species of *Acacia* and other deciduous plants. We spent less time in this habitat than in the others and birds were recorded only through casual observation.

Man-made habitats: this category included grass meadows used as pastures, cultivated fields and villages. In this habitat too, birds were only recorded by casual observation.

Methods

We surveyed birds using mist-netting, fixed-radius point counts (Bibby *et al.* 1992) and casual observations.

We mist-netted at six sites (Figure 1). We used 12-m, four panel, 16-mm mesh nets. Table 1 gives a summary of mist-netting effort. We ringed at sites 3 and 5 in both years. The presence of brood patches was recorded on a scale ranging from 0 (no brood patch) to 3 (large brood patch).

An attempt was made to locate the point counts randomly by walking along a straight line with the help of a compass. One point count was carried out after exactly 6 minutes of walking. However, when dense vegetation or natural obstacles did not allow us to cover a distance of at least 200 m from the preceding point, another 6 minutes were walked before stopping.

At each point vegetation height was measured with a rangefinder (Ranging Opti-meter 120), and the habitat was classified in one of our habitat categories. Each point count lasted 15 minutes, during which all the bird species observed or heard within a radius of 25 m (an area of approximately 0.2 ha) were recorded. Altogether 153 point counts were done in forest (69 in 1997, 84 in 1998), 25 in forest edge (15 in 1997, 10 in 1998) and 23 in wet bush (21 in 1997, 2 in 1998). All point counts were carried out by the same observer (LB).

We used Mann-Whitney tests to compare the number of species seen per point count in the two years of the survey. Only forest and forest edge habitats were compared, as too few counts for statistical comparison were carried out in the wet bush in 1998.

We categorised each bird species as forest-dependent (species which are likely to face extinction if forest habitats disappear, categories FF and F of Bennun *et al.* (1996)) or non-forest (species which are likely to survive if forest disappears, category f, or not listed, in Bennun *et al.* (1996)). The proportion of individuals made up by forest versus non-forest bird species in the different habitats in the two years was compared with chi-squared tests. Throughout this paper the species order and nomenclature follow Ornithological Sub-committee of the EANHS (1996).

Results

Mount Kulal avifauna

Ninety-five species of birds were observed during the survey (Table 2). The richest habitat was the wet bush (61 species), while forest edge (54) and forest interior (38) showed a progressive decrease in diversity. Dry bush and man-made habitats also had a low number of species (respectively 28 and 29), probably in consequence of the lower research effort spent in these habitats.

We recorded 21 species new for Bird Atlas square 26B (Lewis & Pomeroy 1989), but only five of these were forest species (Montane Nightjar *Caprimulgus poliocephalus*, Blackcap *Sylvia atricapilla*, Chiffchaff *Phylloscopus collybita*, Northern Puffback *Dryoscopus gambensis* and Sharpe's Starling *Cinnyricinclus sharpii*). Of the 60 species frequenting forest and forest edge habitats, 20 could be considered forest-dependent and 40 non-forest

according to Bennun *et al.* (1996). However, several species that are not forest-dependent elsewhere in Kenya appeared to be commoner, and probably bred in this habitat, at Mt Kulal, although usually in the glades or along forest edges. These included Red-fronted Tinkerbird *Pogoniulus pusillus*, Cardinal Woodpecker *Dendropicos fuscescens* (individuals of this species had white wing coverts and heavy barring above and were assigned to race *hemprichii*, not to the race *lepidus* that is known to live in forest habitats (Zimmerman *et al.* 1996)), Grey-backed Camaroptera *Camaroptera brachyura*, African Paradise Flycatcher *Terpsiphone viridis*, Tacazze Sunbird *Nectarinia tacazze*, Golden-winged Sunbird *Nectarinia reichenowi*, Yellow-bellied Waxbill *Estrilda quartaria* and Yellow-crowned Canary *Serinus canicollis*.

Mist-netting

Table 1 and 2 summarise the results of mist netting activity. Capture rates (Table 1) were usually higher in forest-edge and wet bush (sites 1,2,5) than in the forest (sites 3,4,6). Table 3 compares the species caught at the two sites (3 and 5) where we ringed in both years of the survey. At both sites capture rates were higher but total number of species lower in 1997 than in 1998. In 1998, at site 5 there was a decrease in the number of Kulal White-eye and Common Bulbul *Pycnonotus barbatus*, while at site 3 we caught fewer White-starred Robin *Pogonochichla stellata*, Cabanis's Greenbul *Phyllastrephus cabanisi* and Olive Thrush *Turdus olivaceus*, but more Abyssinian Ground Thrushes *Zoothera piaggiae* and Common Bulbuls.

Considering the number of individuals captured, in 1997 forest-dependent and non-forest birds were respectively 44% and 56% of the total ($n = 132$) in wet bush sites and 83% and 17% in forest ($n = 98$); in 1998 the proportions were 13% and 87% in wet bush ($n = 40$) and 69% and 31% in forest ($n = 138$). These changes in proportions were statistically significant (χ^2 test, $df = 1$: wet bush, $P < 0.001$; forest $P < 0.02$), suggesting that forest birds moved towards the wet bush in the wet year 1997, while non-forest species penetrated the forest in the dry year 1998.

Table 4 reports the number and state of development of brood patches observed in the birds captured in 1997. No brood patch was recorded in 1998, suggesting that no breeding activity was occurring during our second year of survey.

Point counts

Table 2 shows the results of the point counts carried out in the forest, forest edge and wet bush. A higher number of species was observed in the forest, no doubt because of the higher number of point counts carried out in this habitat. Several species, including Common Bulbul, Olive Thrush, Kulal White-eye, Amethyst Sunbird *Nectarinia amethystina* and Eastern Double-collared Sunbird *Nectarinia mediocris*, were commoner in forest habitats in 1998 than in 1997. In the forest, a higher number of species/point count was

Table 1. Summary of mist-netting effort and results, 1997–1998

Year	Habitat	Site number	Date	Net-metre-hours	Birds caught ¹	Capture rate	Species caught
1997	Wet bush	2 & 5	26–27 & 29–30/11; 13–17/12	2190	132	60.3	19
1997	Forest edge	1	22–26/11; 11–12/12	3408	81	23.8	15
1997	Forest	3 & 4	1–5/12; 7–10/12	7787	98	12.6	15
1997	All	All		13385	311	23.2	30
1998	Wet bush	5	14–16/10	2040	40	19.6	17
1998	Forest	3 & 6	17–20/10; 25–28/10	9678	138	14.3	24
1998	All	All		11718	178	15.2	29

¹Birds per 1000 metre-net-hours

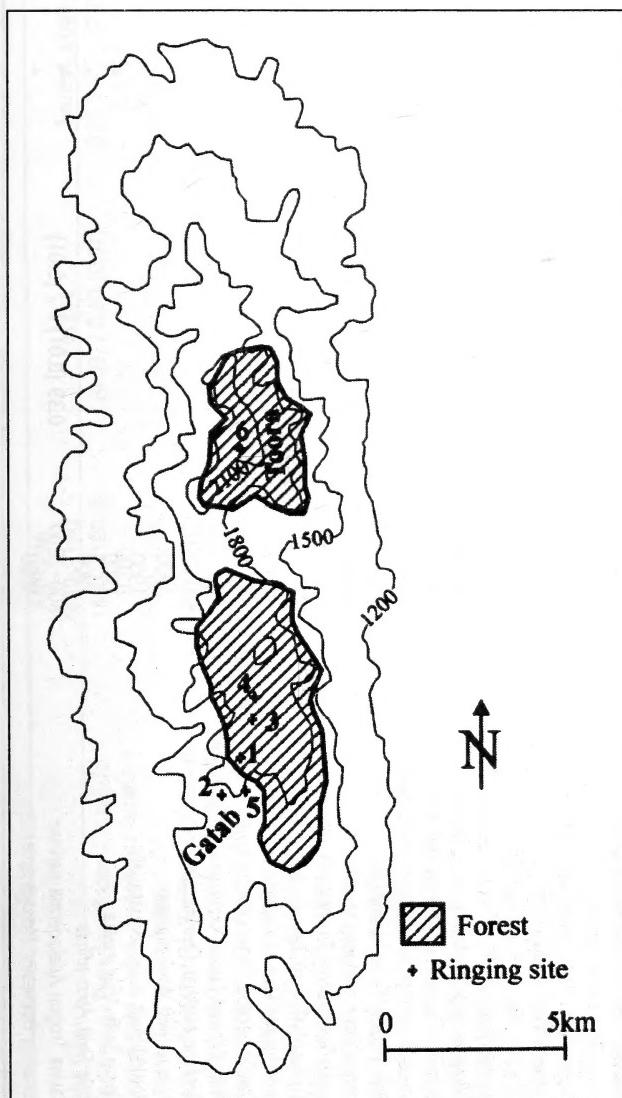


Figure 1. Map of the study area, showing the location of the six mist-netting sites.

Table 2. List of birds observed on Mt Kulal and the habitats where they were recorded. Figures without parentheses show capture rates (no. of individuals per 1000 net-metre-hours); those in parentheses are frequencies of point-count observation. Figures before the slash (/) are for 1997, those after it are for 1998. An asterisk (*) marks species that were present in that habitat but were not mist-netted nor recorded in any of the point counts

Species	Altitude range (m)	Forest	Forest edge	Wet bush	DB	MM	QSD
Black Kite <i>Milvus migrans</i>	1800			*	*	*	*
Egyptian Vulture <i>Necophron percnopterus</i>	1800			*	*	*	*
Hooded Vulture <i>Necrosyrtes monachus</i>	1800			*	*	*	*
Bateleur <i>Terathopius ecaudatus</i>	1500–1800			*	*	*	*
Gabar Goshawk <i>Micronisus gabar</i>	2100			*	*	*	*
Mountain Buzzard <i>Buteo oreophilus</i>	1700–2200	*		*	*	*	*
Augur Buzzard <i>B. augur</i>	1800	*		*	*	*	*
Booted Eagle <i>Hieraetus pennatus</i>	1700–1800	*		*	*	*	*
Lanner Falcon <i>Falco biarmicus</i>	1800	*		*	*	*	*
Peregrine Falcon <i>F. peregrinus</i>	1800	*		*	*	*	*
Crested Francolin <i>Francolinus sephaena</i>	1500–1700				–(0.05) / –(–)	*	*
Yellow-necked Spurfowl <i>F. leucoscepus</i>	1700–1800				*	*	*
Helmeted Guineafowl <i>Numida meleagris</i>	1800				–(0.05) / –(–)	*	*
Emerald-spotted Dove <i>Turtur chalcospilos</i>	1500–1700				–(0.05) / –(–)	*	*
Olive Pigeon <i>Columba arquatrix</i>	1800–2000	*					
Lemon Dove <i>Aplonetta larvata</i>	1800–2100	0.39 (0.06) / 0.62 (0.01)	*		*		
Dusky Turtle Dove <i>Siretropelia lugens</i>	1800–2000	–(0.03) / –(–)					
Hartlaub's Turaco <i>Tauraco hartlaubi</i>	1700–2200	–(0.09) / –(0.06)	–(0.07) / –(–)		–(0.10) / –(–)		
Red-chested Cuckoo <i>Cuculus solitarius</i>	1800	*					
Klaas's Cuckoo <i>Chrysococcyx klaas</i>	1800–1900	*					
White-browed Coucal <i>Centropus superciliosus</i>	1500–1800						
Montane Nightjar <i>Caprimulgus poliocephalus</i>	1800–2000						
Nyanza Swift <i>Apus nianae</i>	1900						
Mottled Swift <i>Apus aegaeotauralis</i>	1900						
Alpine Swift <i>Apus melba</i>	1900						
Little Swift <i>Apus affinis</i>	1900						
Narinia Trogan <i>Apaloderma narinae</i>	1800–2200	0.39 (0.01) / –(0.01)					
Eurasian Bee-eater <i>Merops apiaster</i>	1800	*					

Species	Altitude range (m)	Forest	Forest edge	Wet bush	DB	MM	QSD
Red-fronted Tinkerbird <i>Pogonolius pusillus</i>	1800–2100	– (0.03) / 0.10 (0.01)	0.29 (–) / – (0.20) – (0.07) / – (–) 0.29 (–) / – (–)	0.46 (–) / – (–)	*	*	*
Spot-flanked Barbet <i>Tricholaema lacrimosa</i>	1700	– (–) / 0.10 (–)					*
Lesser Honeyguide <i>Indicator minor</i>	1900–2100						*
Nubian Woodpecker <i>Campetherina nubica</i>	1800			*			*
Cardinal Woodpecker <i>Dendropicos fuscescens</i>	1900–2000	0.13 (–) / – (–)		*			*
Red-rumped Swallow <i>Hirundo daurica</i>	1800–1900			*			*
Rock Martin <i>Hirundo fuligula</i>	1800–1900			*			*
Grey Wagtail <i>Motacilla cinerea</i>	1900	– (0.01) / – (–)					*
Yellow Wagtail <i>Motacilla flava</i>	2100	*					*
Long-billed Pipit <i>Anthus similis</i>	1900	– (–) / 0.21 (0.02)	*	*			*
Tree Pipit <i>Anthus trivialis</i>	1800–2200	2.83 (0.19) / 0.72 (0.24)	*	*			*
Cabanis's Greenbul <i>Phyllastrephus cabanisi</i>	1800			*			*
Northern Brownbul <i>P. strepitans</i>	1500–2100	– (0.01) / 1.14 (0.17) – (0.04) / 0.10 (0.11)	0.59 (0.33) / – (0.50)	– (–) / 1.47 (–) 11.87 (0.24) / 3.43 (–)	*	*	*
Common Bulbul <i>Pycnonotus barbatus</i>	1900–2200						*
African Hill Babbler <i>Pseudalcippe abyssinica</i>	1500–1800			*			*
Rufous Chatterer <i>Turdoides rubiginosus</i>	1700–2200	2.44 (0.19) / 1.76 (0.15) 0.39 (0.10) / 0.31 (0.02)	0.29 (0.07) / – (0.10) 1.47 (0.40) / – (0.10)	5.02 (0.10) / – (–) – (0.10) / 3.43 (–)	*	*	*
White-starred Robin <i>Pogonochela stellata</i>	1700–2100						*
Cape Robin-Chat <i>Cossypha caffra</i>	1800						*
Nightingale <i>Luscinia luscinia</i>	1800						*
Sprosser Luscinia <i>megarhynchos</i>	1800	– (–) / 0.21 (–)					*
Northern Wheatear <i>Oenanthe oenanthe</i>	1800–2100						*
Pied Wheatear <i>O. pleschanka</i>	2000						*
Abyssinian Black Wheatear <i>O. lugubris</i>	2000						*
Common Rock Thrush <i>Monticola saxatilis</i>	2000						*
Little Rock Thrush <i>Monticola rufocinereus</i>	1500–1900		– (0.07) / – (–)		0.46 (0.05) / – (–)		*
Olive Thrush <i>Turdus olivaceus</i>	1700–2200	2.44 (0.30) / 0.83 (0.52) 0.26 (0.07) / 1.34 (0.07)	3.23 (0.20) / – (0.30)	2.28 (0.05) / 0.49 (–) – (–) / 0.49 (–)	*	*	*
Abyssinian Ground Thrush <i>Zoothera piaggiae</i>	1900–2200						*
Spotted Flycatcher <i>Muscicapa striata</i>	1800–2000						*
African Grey Flycatcher <i>Bradornis microrhynchus</i>	1500–2200	– (–) / – (0.01)	*				*
Blackcap <i>Sylvia atricapilla</i>	1500–2100	– (–) / 0.21 (–)	0.59 (–) / – (–)	0.46 (–) / – (–)	*	*	*
Chiffchaff <i>Phylloscopus collybita</i>	1900–2200	– (0.04) / – (–)					*
Willow Warbler <i>Phylloscopus trochilus</i>	1700	– (–) / – (0.01)					*
Brown Woodland Warbler <i>P. umbrovirens</i>	1700–2200	0.77 (0.59) / 0.93 (0.52)	4.11 (0.53) / – (0.30)	0.46 (0.05) / 0.49 (–) – (0.14) / – (–)	*	*	*
Boran Cisticola <i>Cisticola bodessa</i>	1500–1800						*

Table 2. Continued.

Species	Altitude range (m)	Forest	Forest edge	Wet bush	DB	MM	QSD
Grey Wren-warbler <i>Calamonastes simplex</i>	1500–1600	0.51 (0.36) / 0.52 (0.24)	2.64 (0.93) / – (0.80)	6.39 (0.76) / 5.39 (–)	*	*	*
Grey-backed Camaroptera <i>Camaroptera brachyura</i>	1500–2200	– (–) / 0.21 (0.01)	*	*	*	*	*
Abyssinian White-eye <i>Zosterops abyssinicus</i>	1700–2100	0.77 (0.23) / 1.45 (0.71)	5.28 (0.20) / – (0.70)	23.29 (0.19) / 0.49 (–)	*	*	*
Kulai White-eye <i>Z. kulaiensis</i>	1500–2200	*	*	*	*	*	*
White-bellied Tit <i>Parus albiventris</i>	2000	0.51 (0.06) / 0.21 (0.13)	1.17 (–) / – (0.10)	0.46 (–) / 0.49 (–)	*	*	*
Paradise Flycatcher <i>Terpsiphone viridis</i>	1800–2200	*	*	*	*	*	*
Common Fiscal <i>Lanius collaris</i>	1800–1900	*	*	*	*	*	*
Bribri <i>Milvus afra</i>	1500	*	*	*	*	*	*
Three-streaked Tchagra <i>Tchagra jamesi</i>	1800	0.26 (0.04) / – (0.12)	1.47 (0.07) / – (–)	0.46 (0.05) / – (–)	*	*	*
Tropical Boubou <i>Laniarius aethiopicus</i>	1800–2100	*	*	*	*	*	*
State-coloured Boubou <i>L. funebris</i>	1500–2000	– (0.07) / 0.10 (0.02)	– (0.40) / – (–)	0.91 (0.05) / 0.49 (–)	*	*	*
Northern Puffback <i>Dyoscopuss gambensis</i>	1700–2100	*	*	*	*	*	*
Pied Crow <i>Corvus albus</i>	1500–2100	*	*	*	*	*	*
Fan-tailed Raven <i>Corvus rhipidurus</i>	1500–2100	*	*	*	*	*	*
Red-winged Starling <i>Oreopsar rubripennis</i>	1800–2100	*	*	*	*	*	*
Sharpe's Starling <i>Cinnyricinclus sharpii</i>	1800	– (–) / 0.31 (0.12)	– (0.13) / – (–)	0.91 (0.14) / 0.49 (–)	*	*	*
Amethyst Sunbird <i>N. amethystina</i>	1800–2200	*	*	*	*	*	*
Hunter's Sunbird <i>Nectarinia hunteri</i>	1500–1700	*	*	*	*	*	*
Variable Sunbird <i>N. venusta</i>	1500–1800	*	*	*	*	*	*
Eastern Double-collared Sh. <i>N. mediorictis</i>	1800–2200	0.13 (0.13) / 1.76 (0.36)	– (0.13) / – (–)	– (0.33) / – (–)	*	*	*
Marico Sunbird <i>N. mariquensis</i>	1800	*	*	*	*	*	*
Beautiful Sunbird <i>N. pulchella</i>	1800	*	*	*	*	*	*
Shining Sunbird <i>N. habessinica</i>	1900–2000	*	*	*	*	*	*
Taczazze Sunbird <i>N. tacazze</i>	2000	– (–) / – (0.01)	*	*	*	*	*
Golden-winged Sunbird <i>N. reichenowi</i>	2000–2200	– (–) / – (0.02)	*	*	*	*	*
Yellow-spotted Petronia <i>Petronia pyrgita</i>	1500–1800	*	*	*	*	*	*
Baglafecht Weaver <i>Ploceus baglafecht</i>	1600–2200	0.39 (0.04) / 0.41 (0.08)	0.88 (0.20) / – (–)	1.83 (–) / 0.49 (–)	*	*	*
Vitelline Masked weaver <i>P. velatus</i>	1700–1800	*	*	*	*	*	*
Red-headed weaver <i>Anaplectes rubriceps</i>	1600	*	*	*	*	*	*
Yellow-bellied Waxbill <i>Estrilda quadrigula</i>	1900–2200	– (–) / 0.62 (0.04)	– (–) / 0.49 (–)	*	*	*	*
Purple Grenadier <i>Uraeginthus ianthinogaster</i>	1700–1800	*	*	*	*	*	*
Yellow-crowned Canary <i>Serinus canicollis</i>	2100	*	*	*	*	*	*
Stripe-breasted Seedeater <i>S. stratipectus</i>	1500–1700	*	*	*	*	*	*

Table 3. Comparison of the results of mist-netting at sites 3 and 5 in 1997 and 1998

	Site 3 (forest)	Site 5 (wet bush)		
Species	97	98	97	98
Cabanis's Greenbul	14	3	0	0
Common Bulbul	0	11	14	7
White-starred Robin	12	3	0	0
Olive Thrush	10	2	0	1
Abyssinian Ground Thrush	2	10	0	1
Brown Woodland Warbler	4	4	1	1
Grey-backed Camaroptera	3	3	8	11
Kulal White-eye	6	9	45	1
Total no. of individuals	69	56	77	40
No. of species	15	16	11	16
Capture rate (per 1000 mh)	15.5	10.9	60.5	19.6

Table 4. Number and extent of development of brood patches recorded in 1997

Species	Brood patch score				
	0	1	2	3	% ≥1
Slate-coloured Boubou	1	2	1	1	80
Rufous Chatterer	3	0	2	3	63
Red-fronted Tinkerbird	1	1	0	0	50
Purple Grenadier	1	0	0	1	50
Cape Robin-Chat	5	0	0	3	38
Grey-backed Camaroptera	16	4	4	1	36
Baglafecht Weaver	6	1	0	1	25
Kulal White-eye	55	13	4	0	24
Brown Woodland Warbler	17	4	0	0	19
Cabanis's Greenbul	19	3	0	0	14
Common Bulbul	21	1	1	1	13
Tropical Boubou	7	1	0	0	13
Olive Thrush	29	3	1	0	12
African Paradise Flycatcher	8	1	0	0	11
Total	236	34	13	11	20

observed in 1998 (mean 3.7 ± 2.2 s.d.) than in 1997 (2.2 ± 1.5). This difference was statistically significant (Mann-Whitney test, $U = 1341.5$, $P < 0.0001$).

At forest edges, the number of species/point count was higher in 1997 (mean 4.2 ± 1.8) than in 1998 (3.1 ± 1.4), but the difference was not significant (Mann-Whitney test, $U = 42.5$, $P = 0.15$), perhaps owing to the smaller number of point counts carried out in this habitat. Unlike most other species, Kulal White-eye was commoner in this habitat in 1998 than in 1997.

In forest habitats, proportions of individuals of forest-dependent and non-forest species observed during point counts were respectively 75% and 25% in 1997 ($n = 188$) and 73% and 27% in 1998 ($n = 321$). In forest edge habitats,

percentages were 34% and 65% in 1997 ($n = 31$) and 45% and 55% in 1998 ($n = 62$). There was no difference between the two years in the proportion of forest-dependent and non-forest individuals in either habitat (χ^2 test: forest, $P = 0.66$; forest edge, $P = 0.31$). This suggests that the numerical increase of non-forest species in forest habitats in 1998 was paralleled by that of several forest-dependent species (such as Kulal White-eye, Eastern Double-collared Sunbird and Olive Thrush) that had moved to the wet bush in 1997.

Discussion

As Moreau (1966) pointed, Mt Kulal has probably never been connected with other forest blocks in East Africa. Its avifauna must have reached it by crossing substantial expanses of hostile dry habitats. As a result, its bird community is clearly depauperate. We found only 60 species (Table 2) in forest and forest edges at Mt Kulal, a much lower number than in similar forests in central Kenya, such as the Mau (129 species) or the Aberdares (97) (Bennun & Waiyaki 1995). We do not think that the difference is just due to insufficient ornithological coverage: our survey, despite 42 days of field work, provided only five new records of true forest species for atlas square 26B (Lewis & Pomeroy 1989).

Perhaps because of the general paucity of forest species, several non-forest birds have been able to penetrate in the forest, where they may be able to exploit empty ecological niches.

Diamond & Keith (1980) surveyed the avifauna of Mt Kulal and discussed it in terms of island biogeography (MacArthur & Wilson 1967). They stressed that an isolated patch of forest has many similarities with an oceanic island, and probably experiences repeated extinctions and immigrations in its avifauna. They suggested that one species, African Hill Babbler *Pseudoalcippe abyssinica*, could be an example of an extinction at Kulal, as it was observed during their first visit in 1962 but not in the second in 1979. However, this species can be difficult to detect during a short survey. Having observed it during both periods of our survey we doubt that it had gone extinct and only recolonised the mountain recently.

Diamond & Keith (1980) recorded two forest species that we did not find, namely Crowned Hornbill *Tockus alboterminatus* and Collared Sunbird *Anthreptes collaris*. This is puzzling, as both are easy to detect when present. Possibly they have indeed gone extinct on Kulal. On the other hand, it is not surprising that with our longer survey we observed several species not recorded by Diamond & Keith (1980). Possible extinction and colonisation of bird species on Mt Kulal should be assessed with a much longer and more detailed survey; the present data are inadequate.

Mist-netting and point counts showed marked differences in the structure of the forest bird community in the two years. In 1998 we caught fewer birds in mist nets but located more during point counts than in 1997. However, both mist-netting and point counts indicated that the forest was more

species-rich in 1998 than in 1997. We believe that these results can be explained by the strong climatic differences in the two years when our survey was carried out. Both the forest and the surrounding habitats were much drier in 1998 than in 1997. A large number of individuals (of both forest-dependent and non-forest species) that had frequented the wet bush in 1997 appeared to move into the deeper forest in 1998, increasing the species richness of this habitat. Moreover, in 1997 many birds seemed to forage on the forest floor and among the shrubs and were easily mist-netted, while in 1998 they mostly shifted towards higher levels, in the tree canopy, where large amounts of wild fruit were available (L. Borgesio, unpubl. data). Here of course they would be out of the reach of mist-nets. The higher proportion of non-forest species in forest habitats indicated by mist-netting in 1998 should be interpreted cautiously, since the shift of micro-habitat selection must have biased the captures. Mist netting data seem also to show that forest-dependent species make use of non-forested (wet bush) habitats in the wet season. Changes in the bird community of forest edges are less clear, but point count data agree with the pattern found in other habitats (in the dry season non-forest species increased and forest-dependent species shifted towards the forest interior).

Breeding also appeared to be strongly seasonal. Many birds with brood-patches were caught during the wet season in 1997, but none in 1998. Moreover, active nests of several species were observed in November–December 1997, but none in October–November 1998.

Finally, Diamond & Keith (1980) reported that the conservation status of Mt Kulal was worrying, since the regeneration of forest trees looked sparse and unlikely to maintain the forest in the future. Based largely on this statement and on its very restricted distribution, Collar *et al.* (1994) classified the endemic Kulal White-eye as a Critically Endangered Species. Our data do not allow a precise assessment of the conservation status of Mt Kulal's avifauna. However, our observations show that 20 years after the survey of Diamond & Keith neither the bird fauna nor the extent of the forest have changed greatly. Human presence in the area is increasing, as is the exploitation of forest resources. However, human impact on the area is still limited, at present, to occasional opening of gaps in the canopy due to felling of single trees. This appears not to have a severe impact on the structure of the forest, at least for the time being.

During our survey, Kulal White-eye was the bird species most commonly captured, and one of those most frequently observed. This suggests that its population is likely to be quite large, and probably not in severe danger at the moment. Based on these findings, BirdLife International (2000) have reclassified this species as Vulnerable. However, the data show that Kulal White-eye shifts its habitat selection markedly depending on the season. During the wet season it frequents the evergreen bush outside the forest, indicating that its security depends on the conservation of this habitat as well as the forest.

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Comments on the occurrence of 15 Albertine Rift endemic bird species in the Rwenzori Mountains National Park, Western Uganda

Morten Dehn and Lars Christiansen

The Rwenzori Mountains National Park (RMNP) supports 15 of the 24 Albertine Rift endemic bird species (Howard *et al.* 1996). During the second half of 1996 we surveyed the relative abundance and altitudinal distribution of these 15 species in the RMNP (Dehn & Christiansen 2001a, 2001b). Here we synthesise this new information with the results from previous studies.

Methods

Our survey methods involved a combination of observation and mist-netting, described elsewhere (Dehn & Christiansen 1998, 2001a, 2001b). Between July and the beginning of December 1996, we captured 911 birds in total, using 12,300 net metre hours (mh) of standardised mist-netting (438 individuals, 0.035 birds per mh), and approximately 15,900 mh of non-standardised mist-netting (473 individuals, 0.029 birds per mh). A standardised approach allowed us to compare the relative abundances from each of the five eastern study plots. Data from the Kakuka Ridge (1920–3000 m) provide additional information on similarities and differences between the avifauna on the western and eastern slopes of the Rwenzori Mountains (Table 1).

We have reviewed all available published and unpublished information on the Rwenzori avifauna, including results from the 1905–1906 Ruwenzori Expedition (Ogilvie-Grant 1910), which is the single most comprehensive study of flora and fauna ever carried out in these mountains. Other studies include an expedition by Weekes (1949a, 1949b) from 24 December 1946 to 1 January 1947, and surveys by Francis & Penford (1991) on 18–26 June and 12–21 July 1991. Results from these surveys are presented in Howard *et al.* (1996) along with the results from several other studies on flora and fauna in the RMNP. Mike Roy (pers. comm.) mist-netted birds at 2650 m in the Mubuku/Mahoma valleys from 15–22 December 1995, and Willard *et al.* (1998) carried out surveys from 10 November to 12 December 1990 and from 8 April to 1 May 1991.

It is difficult to determine species abundance in a forest habitat. Our data can probably only safely be used to compare relative abundances at different

altitudes in our own survey. Studies using different methods or studies carried out in different seasons may not be directly comparable. Several species are known to migrate to lower altitudes during the colder months (Fry *et al.* 1988) and studies carried out at different times of the year may therefore record fluctuations in population size or absence of a species. Seasonal changes in behaviour may also render a species more or less conspicuous without altering the actual abundance.

Except where indicated, order and nomenclature follow Ornithological Sub-committee of the EANHS (1996); however, where appropriate we have modernised the descriptor 'Rwenzori' in line with current Ugandan usage. All observations are from the Mubuku/Mahoma/Bujuku valleys unless otherwise stated.

Results

Handsome Francolin *Francolinus nobilis* A large francolin managed to escape after being wingshot by a member of the 1905–1906 Ruwenzori Expedition. This particular species was only observed on a few occasions and was never identified even though its cry was heard constantly in the thickest part of the forest (Ogilvie-Grant 1910). Francis and Penford (1991) recorded this species in the Mubuku/Bujuku valleys between 18–26 June 1991 (altitude unspecified). Willard *et al.* (1998) did not record this species during their surveys in 1990–1991. The Information Officer at the National Park Headquarters, Martin Ewanu, told us that regular sightings were made at approximately 2400 m on the Mubuku path leading to the Nyabitaba Hut. According to Britton (1980) this species is found at elevations from 2000–2500 m.

During our surveys, Handsome Francolins were easy to detect due to their loud calls; at dusk we could hear (and tape-recorded) several birds roosting close to our camp at 2400 m. Although our survey lasted 111 days and covered a 1200 m range in altitude, we only recorded this species in the vicinity of our camp at 2400 m. Solitary birds were observed walking along elephant tracks and several dodged our nets after being flushed. We managed to photograph one bird perched on a low branch after flushing it from a track. Dry leaves, twigs and branches cover the forest floor and walking on the smooth elephant tracks allows the birds to move quietly over relatively long distances. This species is probably hunted over most of its range; given its limited distribution and possible narrow altitudinal span, its ecology and general status merit further studies.

Rwenzori Turaco *Musophaga johnstoni* This species was discovered in the Rwenzori by H.H. Johnston in 1901 at an elevation of about 2134 m. It is generally considered to be a high altitude turaco, and during the Ruwenzori Expedition it was commonly observed in the Mubuku Valley in January, February and March at about 2740 m. Sometimes it was observed as high as 3350 m and occasionally as low as 2590 m, but never lower (Ogilvie-Grant

Table 1. Albertine Rift Endemic bird species observed and captured in the Rwenzori Mountains National Park. The abundance intervals (a, b, c, d) indicate the relative densities, based on standardised periods of observations (heard or seen) and mist-netting (1 capture counted as 1 observation): a) >100, b) 50–99, c) 10–49, d) 1–9. Species not recorded during the standardised work, but recorded at other times, are marked '+', and species that were not recorded are marked '-'. Work on the Kakuka Ridge in Bundibugyo District was carried out between 1920 m and 3000 m

Scientific name	Altitude (m)					
	1800	2100	2400	2700	3000	Kakuka
<i>Francolinus nobilis</i>	-	-	d	-	-	-
<i>Musophaga johnstoni</i>	-	-	c	b	c	+
<i>Alethe poliophrys</i>	c	c	c	d	-	+
<i>Cossypha archeri</i>	+	d	c	b	b	+
<i>Phylloscopus laetus</i>	-	d	c	b	-	+
<i>Apalis ruwenzorii</i>	c	c	a	a	a	+
<i>Batis diops</i>	-	-	c	c	-	+
<i>Cryptospiza shelleyi</i>	-	d	+	d	d	-
<i>Cryptospiza jacksoni</i>	+	d	d	d	-	+
<i>Nectarinia alinae</i>	c	c	c	d	-	+
<i>Nectarinia purpureiventris</i>	-	c	b	d	-	-
<i>Nectarinia regia</i>	-	+	a	a	a	+
<i>Nectarinia (afra) stuhlmanni</i>	-	+	d	d	a	-
<i>Parus fasciiventer</i>	-	d	d	d	d	+
<i>Ploceus alienus</i>	+	c	d	d	d	+

1910). Weekes (1949b) obtained a specimen at 2130 m and found this species regularly up to 3700 m. Francis & Penford (1991) recorded it in the Mubuku/Bujuku valleys (altitude unspecified) on no more than three out of 11 days. Willard *et al.* (1998) captured this species at 2700 m and at 3400 m. Fry *et al.* (1988) record it as locally common in forests at 2200–3400 m in Rwenzori, but most abundant in bamboo and *Podocarpus* at about 3000 m just below the tree heath zone.

We first recorded the Rwenzori Turaco at 2400 m on the eastern slopes, and only observed them once on the Kakuka Ridge at approximately 2400 m. Small groups were commonly seen and heard at 2700 m between the Mubuku Valley and the Mahoma Valley; it appeared to be uncommon elsewhere. The National Park's Information Officer, Katsuba Flavienus, told

us that this species moves into the lower elevational montane forest during periods with heavy rain. Rwenzori Turacos were occasionally observed feeding together with Black-billed Turaco *Tauraco schuetti* (see Dehn & Christiansen 2001b).

Red-throated Alethe *Alethe poliophrys* This alethe was procured by G. Archer in the Rwenzori in 1902. During the Ruwenzori Expedition it was recorded in the Mubuku Valley between 2130–2440 m in January, between 1980–2440 m in February and between 2130–2740 m in March. Francis & Penford (1991) caught five birds at Kakuka (c. 1970 m) and Kilembe (c. 1670 m). Willard *et al.* (1998) had 6–10 captures at 1960 m, 11–20 captures at 2075 m and 2–5 captures at 2700 m. Roy netted 7 of this species (out of a total of 114 captures).

During our study, the Red-throated Alethe was frequently netted (39 captures out of 911). We made 13 observations at 1800 m, 19 observations at 2100 m, 23 observations at 2400 m, 8 observations at 2700 m, but none at 3000 m. Overall this species appears to be common at elevations about 1800–2400 m in the Mubuku Valley. According to Ogilvie-Grant (1910), these birds habitually follow 'soldier ants'. We did not observe this behaviour even though 'soldier ants' are very common at 1800–2700 m in the Mubuku/Mahoma valleys.

Archer's Robin Chat *Cossypha archeri* Members of the Ruwenzori Expedition encountered this species in the Mubuku Valley between 1830–2740 m in January, between 2135–3355 m in February and between 1980–2440 m in March. It was numerous in the bamboo zone and up to about 3960 m (Ogilvie-Grant 1910). Willard *et al.* (1998) had 2–5 captures at 2075 m, 11–20 captures at 2700 m, 6–10 captures at 3400 m and a sight record at 4000 m. Using their day frequency method, Francis & Penford (1991) recorded Archer's Robin Chat on 4 out of 11 days. Roy captured 3 birds ($n = 114$).

During our study the abundance of this species increased monotonically with increasing altitude between 2100 m and 3000 m. Mist-netting resulted in only seven captures on the eastern slopes and one capture on the western Kakuka Ridge.

Red-faced Woodland Warbler *Phylloscopus laetus* In 1906 this species was very plentiful in the forest zone and lower parts of the bamboo zone, and was recorded between 1830–2745 m in January, between 2135–2745 m in February and between 2440–2745 m in March (Ogilvie-Grant 1910). Francis and Penford (1991) recorded the day frequency of this species to be 5/11 days and netted one bird ($n = 83$). Willard *et al.* (1998) had one sight record at 1960 m, 6–10 captures at 2075 m and 6–10 captures at 2700 m. Roy captured one bird ($n = 114$).

We recorded this species with increasing abundance ascending from 2100 m up to 2700 m. Only five birds were netted ($n = 911$).

Collared Apalis *Apalis ruwenzorii* This species is recorded in southwest Uganda (Rwenzori) between 1550 m and 3100 m (Urban *et al.* 1997). It was encountered between 1830–3050 m during the Ruwenzori Expedition, but rarely seen above 2590 m. It was numerous in the forest zone and low margins of the bamboo zone, but never seen in the treetops (Ogilvie-Grant 1910). Francis & Penford (1991) recorded this species on 11/11 days and mist-netted four individuals ($n = 83$). Willard *et al.* (1998) had 11–20 captures at 1960 m, 6–10 captures at 2075 m and 11–20 captures at 2700 m. Roy captured five birds ($n = 114$).

We recorded this species on both the eastern and western slopes. It was common at 1800 m and 2100 m and very common between 2400–3000 m on the eastern slopes. This was a frequently captured species during our study with a total of 49 individuals ($n = 911$).

Stripe-breasted Tit *Parus fasciiventer* Stuhlmann also obtained this species in 1893, probably high up in the Butagu Valley on the western slopes of the Rwenzori (Ogilvie-Grant 1910). It was observed between 1830–3350 m in the Mubuku Valley from January to March 1906, where it was common in the forest zone but rarely seen as high as 3350 m (Ogilvie-Grant 1910). Willard *et al.* (1998) captured one bird at 1960 m and at 2075 m, and had 2–5 captures at 2700 m. Francis and Penford (1991) found this species at all their three study areas in the forest zone, recording it on 3/11 days or less.

In the eastern valleys we recorded this species less than 10 times at each study plot ranging from 2100 m up to 3000 m. One or possibly two individuals were busy collecting lichens, *Usnea* sp., for nest-building at our camp at 3000 m, between 28 November and 1 December. The chosen location was a cavity in an 8 m tall *Erica*; the entrance hole was 4 cm in diameter and positioned approximately 3 m above ground level. The Stripe-breasted Tit was also found with some regularity on the Kakuka Ridge.

Rwenzori Batis *Batis diops* This species is most abundant in low closed bamboo forest ridges up to about 2800 m (Urban *et al.* 1997). The Rwenzori Expedition observed it between 1830–2590 m in the forest zone where it was very numerous in dense undergrowth and high trees (Ogilvie-Grant 1910). Willard *et al.* (1998) had 2–5 captures at 2075 m and 6–10 captures at 2700 m. Roy captured four birds ($n = 114$).

We frequently recorded Rwenzori Batis on both the western and eastern slopes. Several song-posts were mapped at 2400 m and 2700 m. Birds with brood patches were captured in August and October (Urban *et al.* give a record of a female that had recently laid in mid-November). We found this species to be sympatric with Chin-spot Batis *B. molitor* on both the eastern and western slopes (Dehn & Christiansen 2001b).

Blue-headed Sunbird *Nectarinia alinae* This sunbird was recorded between 1680–2740 m in the Mubuku Valley from January to April 1906 (Ogilvie-Grant 1910). Francis & Penford (1991) recorded it on 8/11 days and netted

11 birds ($n = 83$). Willard *et al.* (1998) had > 20 captures at 1960 m, > 20 captures at 2075 m and > 20 captures at 2700 m. Roy captured 11 birds ($n = 114$).

We frequently observed this species foraging near the ground for nectar and insects and captured 48 birds ($n = 911$). During our survey this species appeared to be common between 1800–2400 m and uncommon at 2700 m.

Purple-breasted Sunbird *Nectarinia purpureiventris* During the Rwenzori Expedition one bird was shot at 2130 m in the Mubuku Valley; this was the only encounter. Francis & Penford (1991) recorded this species in the Mubuku/Bujuku valleys on no more than 3/11 days in the forest zone. Willard *et al.* (1998) had 2–5 captures at 1960 m and 2–5 captures at 2075 m.

We only had three captures ($n = 911$) at 2400 m, but the species was very conspicuous at 2100 m, 2400 m and 2700 m. It appeared confined to a narrow altitudinal range with a maximum abundance at about 2400 m. It congregated in large flowering *Sympomia globulifera* trees with up to 50 birds feeding together, along with several other species such as Sharpe's Starling *Cinnyricinclus sharpii*, Slender-billed Starling *Onychognathus tenuirostris* and Yellow White-eye *Zosterops senegalensis*.

Regal Sunbird *Nectarinia regia* This species was observed in the Mubuku Valley between 1830–3050 m from January to April 1906, and 30 specimens were obtained (Ogilvie-Grant 1910). Francis & Penford (1991) recorded Regal Sunbirds on 4/11 days in the forest but none was mist-netted. Willard *et al.* (1998) had 2–5 captures at 1960 m, > 20 captures at 2075 m and > 20 captures at 2700 m. Roy mist-netted 13 birds ($n = 114$).

During our study 115 *N. regia* were netted ($n = 911$), making it the second most frequently captured species after the Yellow-whiskered Greenbul *Andropadus latirostris* (149 captured). It was the most commonly netted and observed species at 2400 m (25 netted, $n = 98$, > 100 observations), 2700 m (33 netted, $n = 105$, > 100 observations) and 3000 m (25 netted, $n = 89$, > 100 observations).

Stuhlmann's Double Collared Sunbird *Nectarinia stuhlmanni* The Ornithological Sub-committee (1996) lists this taxon as a sub-species of Greater Double-collared Sunbird *N. afra*, *contra* Britton (1980). This sunbird was obtained by Stuhlmann in 1893, probably high up in the Butagu Valley on the western slopes of the Rwenzori (Ogilvie-Grant 1910). In East Africa it is found only in the Rwenzori Mountains (Britton 1980). It was observed in the Mubuku Valley between 3050–3415 m from January to April 1906, but appeared to be most plentiful at about 3050 m (Ogilvie-Grant 1910). Willard *et al.* (1998) (who term it *N. afra stuhlmanni*) had 2–5 captures at 2075 m, > 20 captures at 2700 m and > 20 captures at 3400 m.

Bamboo *Arundinaria alpina* and montane forest are gradually replaced by sub-alpine heather at approximately 3000 m in the Bujuku Valley. In this transitional zone between bamboo and giant heather, Stuhlmann's Double

Collared Sunbird was the second most commonly netted and observed species (Regal Sunbird being the most common). We observed Stuhlmann's Double Collared Sunbird infrequently at 2100 m and 2400 m, and netted one ($n = 105$) at 2700 m and 24 ($n = 89$) at 3000 m. This abrupt change in abundance suggests strong affinities for habitats at about 3000 m.

Strange Weaver *Ploceus alienus* The members of the Ruwenzori Expedition collected a "fine series" of this weaver between January and March 1906. This species was recorded between 1680–2590 m, "frequenting both the forest and the more open country below" (Ogilvie-Grant 1910). Francis & Penford (1991) recorded the Strange Weaver on 5/11 days in the forest zone and mist-netted 2 birds ($n = 83$). Willard *et al.* (1998) had > 20 captures at 1960 m, 6–10 captures at 2075 m and 6–10 captures at 2700 m.

During our study this species was infrequently recorded, with less than 15 observations at each elevational study plot. It appeared to be equally common throughout the transect. A total of 20 birds were captured ($n = 911$).

Shelley's Crimsonwing *Cryptospiza shelleyi* Collar *et al.* (1994) comment of this globally Vulnerable species that "it is generally rare (only common in a few threatened forests; but it shows curious fluctuations in abundance, suggesting seasonal movements) and appears to have suffered a dramatic decline since the 1970s for reasons unknown". A male specimen was apparently obtained by G. Archer in the Rwenzori in 1902, but the exact locality is not recorded (Ogilvie-Grant 1910). Shelley's Crimsonwing was not met with by the members of the Ruwenzori Expedition, nor recorded by Weekes (1949b), Francis & Penford (1991) and Howard *et al.* (1996). Roy captured one bird ($n = 114$, sex unspecified) in December 1995. From 10 November to 12 December 1990 and from 8 April to 1 May 1991, Willard *et al.* (1998) found it with some regularity from 1960 m to 3400 m, with 2–5 captures at 1960 m, 1 capture at 2075 m, 6–10 captures at 2700 m and 1 capture at 3400 m.

We mist-netted five male birds and no females. If males and females were equally abundant and easy to capture, then the probability of mist-netting five males would be only 3%. This may have been a simple chance event, or reflect some behavioural difference between the sexes (for example, females might have been busy incubating eggs). There is no information on the breeding season of this species (Brown & Britton 1980). The five males were netted at 2100 m (1), 2400 m (2), 2700 m (1) and 3000 m (1). Only one bird was observed at 2700 m, in the low dense vegetational scrub of mixed *Mimulopsis ellottii* (Acanthaceae) and *Piper capense* (Piperaceae). All four crimsonwing species (*C. jacksoni*, *C. reichenovii*, *C. salvadorii* and *C. shelleyi*) appear to favour dense undergrowth habitats that can probably only be surveyed effectively by mist-netting. We found Shelley's Crimsonwing to be the rarest *Cryptospiza* in the RMNP, with just five captures out of a total of 76 for all species.

Dusky Crimsonwing *Cryptospiza jacksoni* This species was observed between 1830–2590 m from December 1905 to March 1906 (Ogilvie-Grant 1910). Willard *et al.* (1998) had 11–20 captures at 1960 m, 6–10 captures at 2075 m and 2–5 captures at 2700 m. Roy did not capture this species ($n = 114$).

The Dusky Crimsonwing was the only *Cryptospiza* that we commonly mist-netted, with a total of 47 birds ($n = 911$). This species was infrequently observed in the Mubuku/Mahoma/Bujuku valleys and on the Kakuka Ridge, but was also recorded in heavily degraded forest patches at 1700 m outside the National Park.

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Notes on the behaviour and ecology of Sharpe's Longclaw *Macronyx sharpei*, a threatened Kenyan grassland endemic

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Sharpe's Longclaw *Macronyx sharpei*, a Kenyan endemic and restricted-range bird species, is confined to the Kenyan Mountains Endemic Bird Area (EBA) in the country's central highlands (Zimmerman *et al.* 1996, Stattersfield *et al.* 1998). It is known from grassland on the plateaux to either side of the central Rift Valley, and parts of Mt Elgon, Mt Kenya and the Aberdares (Britton 1980, Lewis & Pomeroy 1989, Zimmerman *et al.* 1996). Collar *et al.* (1994) listed Sharpe's Longclaw as near-threatened, but its status has been revised to globally Vulnerable in the light of recent information on its status (BirdLife International 2000).

During studies undertaken in 1995 and 1996, we documented grassland habitat selection (Muchai *et al.* in press) and response to grassland fragmentation (Lens *et al.* 2000), as well as community attitudes towards Sharpe's Longclaw conservation (Muchai *et al.* in review). However, basic behavioural information on this species, necessary for successful conservation (see examples in Caughley & Gunn 1996, Clemons & Buchholz 1997) is still very patchy. Some anecdotal observations are summarised in Keith *et al.* (1992). This paper describes our observations on the species' behaviour, in particular breeding, roosting, foraging, territoriality and social organisation, adding to or confirming what is already on record.

Study area and methods

From April 1995 to March 1996 we observed and counted Sharpe's Longclaws in forty 4-ha grassland plots on a 60-km transect within the Kinangop Plateau (Nyandarua district, central Kenya: 0°32'–46' S; 36°29'–38' E). This is a stretch of montane grassland at 2400–3000 m altitude located between the Aberdare mountains (the easternmost scarp of the Gregory Rift Valley) and the rift floor. Additional details are given in Lens *et al.* (2000) and Bennun & Njoroge (1999). Between November 1995 and May 1996, detailed behavioural data were collected in a 3-km² study site near the village of Heni (South Kinangop; 0°46'70" S; 36°33'10" E).

The in-depth behavioural and ecological study at Heni involved regular longclaw censuses (using a 50-m rope held between two observers and dragged over the grass) and mapping in six plots (18–27 ha) each divided

into six sub-plots (4–5 ha) (additional details are given in Muchai *et al.*, in press). Other bird species in the grasslands were also recorded. Detailed behavioural observations were also regularly made at randomly selected sites representing the three main grassland types (short grass without tussocks, short grass with tussocks and long grass: Lens *et al.* 2000). Behaviour was recorded by individual scan-sampling (Altman 1974). Using a funnel cage system we trapped two individuals, which were colour-banded and wing-tagged. These individuals provided additional information on territorial behaviour and patterns of mobility.

Results and discussion

Population composition

At the Heni study site, a total of 123 Sharpe's Longclaws were observed in 41 territories. These included 105 adults, 11 immatures, 5 juveniles and 2 nestlings. One adult and one fully-grown bird were caught and wing-tagged. They weighed 39.0 g and 39.4 g respectively; other biometrics were within the ranges given by Keith *et al.* (1992).

Escape tactics

Sharpe's Longclaw was usually found on the ground. At the approach of an observer, the birds generally walked or ran quickly away, trying to hide in the grass or behind a tussock. In open areas they might crouch close to the ground. When approached closely, the birds flew with reluctance. As tussock vegetation presumably is essential for hiding, its removal might have considerable conservation implications (see Lens *et al.* 2000).

Flight and display

Several types of flight were observed:

- 1 The male's display flight is well described by Keith *et al.* (1992). Individual birds differed in the duration of aerial display, but these flights lasted at most 10 minutes and ended with a sharp drop straight down to the ground. Display flight was observed throughout the study period. Although quantitative data are lacking, display was infrequent during the non-breeding period, when males might display once or twice a day, compared to the breeding season, when males displayed approximately once an hour.
- 2 When flushed, individuals generally flew low and straight for a short distance, usually less than 50 m, descending in a shallow, gradual, fluttering glide (1,264 observations). Such flights were usually accompanied by a contact call (see below). Less frequently, individuals rose almost vertically upwards for about 20 m, without singing, then dropped rapidly down to the ground a short distance away (76 observations).

- 3 The birds made low, straight flights when moving between foraging patches.
- 4 Two to three birds followed each other in a chasing style in quick, swift and manoeuvring low flights and then quickly alighted. This kind of flight behaviour was mainly observed during early sunny mornings (98 observations). Similar short, rapidly fluttering flights by breeding pairs are described by Keith *et al.* (1992).

Voice and song

The birds made a variety of calls:

- 1 The contact call was a soft thin *tsip-tsip-tsip* note repeated during low, straight flights.
- 2 The flight display song was heard frequently during the breeding season, but also at other times. It consisted of a series of variably-pitched notes, *yo-yo-yo-yo twi tue*.
- 3 Territorial males sang from a perch on a fence, post or grass tussock with a thin repeated *cheeu* or *tue-tu-tui-wee*.
- 4 A *tswip* call (like a modified, partial contact call), possibly an alarm call.
- 5 A mobbing call, *chruuuu*.

The juvenile begging call was a loud *tschhh, tschhh* typical of passerine nestlings.

Breeding habits

Between 22 April and 3 May 1996 we found one empty nest, one nest with two eggs (another nest with two eggs was found 27 June 1995) and one nest with two nestlings (observed until they fledged on 3 May 1996). Individuals in eight other territories were observed carrying food during the same period, which, as expected, was immediately after the peak rainy season (cf. Keith *et al.* 1992). Although we looked for nests when birds were flushed just under the rope or when flushed birds showed behaviour suggestive of nesting, we did not specifically search for nests during other periods of the year.

All the nests were hidden at the base of bending grass tussocks. The cup-shaped nests were 6 cm in diameter, 9 cm deep, and made of fine grass. The eggs were pale greenish-cream with some dark-brown speckling.

Nestlings (around six days old when found) were observed for nine days until fledging. The nestlings were fed on insects, mainly beetles and grasshoppers. When first located, the nestlings' reddish-pink bodies were covered by long blackish-grey down. The legs were reddish yellow and relatively long-clawed. The gape was bright yellow and the inside of the mouth pale red. At fledging, the young birds appeared as described by Keith *et al.* (1992).

At least two adults were seen bringing in food and attending the nestlings. Undisturbed birds carrying food would land some 20 m away from the nest, then cautiously walk towards it. In three other territories, attempts to locate the nest by following adults carrying food failed, due to alarm calls given by 'watchers' among the group. The birds carrying food responded by walking back, and sometimes eating the food item. As described by Keith *et al.* (1992), birds flushed from the nest flew heavily for a short distance and then ran as if injured, 'freezing' for some seconds before flying again.

Sharpe's Longclaws were often found in groups of more than two birds. Very little is known about the species' social structure and breeding biology. However, a number of studies, notably that of Komdeur (1992, 1994) on Seychelles Warblers *Acrocephalus sechellensis*, have shown that habitat quality may determine the extent of co-operative breeding behaviour in a population. In this study, group sizes of Sharpe's Longclaw ranged from 2–7, with the larger groups in higher-quality areas. It is possible that Kinangop Plateau habitats are already saturated, reducing the chances of young birds acquiring good territories and breeding. Our data are consistent with potential breeders in the scarce, high-quality habitats choosing to remain in their natal territories. While co-operative breeding has not been conclusively demonstrated in this species, it is suggestive that supernumerary 'watcher' birds gave alarm calls when we attempted to follow adults that were carrying food to the nest. More research is needed to establish the birds' social system, as this too may have implications for their conservation (cf. Njoroge & Bennun 2000).

Roosting

Sharpe's Longclaw roosted solitarily on the ground. The roosting site for the night was either a hollow scooped out by the bird at the base of a tussock or a hollow within a tussock. No particular site appeared to be used regularly.

Preening

Sharpe's Longclaw usually preened while on the ground (289 observations made). Preening was observed at any time whenever a bird rested, or while it basked during early sunny mornings or after rain.

Feeding

A total of 20,960 pecks were recorded during 90 hours of observation. The birds foraged by walking through the grass and searching for prey, sometimes running after particular items. Prey items were mainly obtained from the surface of short grasses (98% of the pecks), but occasionally from grass tussocks or particular herbaceous plants, mainly *Conyza* spp. Aerial feeding on flying insects was observed three times. Prey items included beetles, grasshoppers, bugs, ants, butterflies and spiders. Although the birds were often observed from just 5–10 m distance, other prey items could not

be identified. Large prey items like grasshoppers were hit against the ground in an effort to break them. The longclaws' preferred foraging locations included areas of short grass with tussocks, or open patches among tall grass. Heavily-grazed grasslands, and non-grassland areas (shambas, woodlots, bare ground and weedy areas) were consistently avoided during the study period. Birds usually flew to a new site after about an hour or so of foraging in one area.

Sharpe's Longclaw was a solitary feeder and rarely foraged close to conspecifics or individuals of other species. However, it sometimes interacted with Grassland Pipit *Anthus cinnamomeus*, Yellow-throated Longclaw *Macronyx croceus*, and Fiscal Shrike *Lanius collaris*, and more rarely with Red-capped Lark *Calandrella cinerea*, Rufous-naped Lark *Mirafr a africana*, Stonechat *Saxicola torquata* and Yellow Wagtail *Motacilla flava*. In all the interactions with Grassland Pipit ($n = 18$), Yellow-throated Longclaw ($n = 5$) and Fiscal Shrike ($n = 8$), Sharpe's Longclaw was subordinate. On two occasions, Black-winged Plovers *Vanellus melanopterus* were observed showing aggressive behaviour towards Sharpe's Longclaws. The few interspecific interactions suggest that these grassland species may have different microhabitat and foraging site preferences.

Territorial behaviour

Only males appeared to defend territories actively. Territorial defence included display flights and songs, calls made while perching on posts or tall tussocks near the boundary of the territory, and actual physical contact and chasing of intruders (95 observations). In a territorial group with five members, two of which were males (one wing-tagged), only one of the males demonstrated territorial behaviour.

Sharpe's Longclaw occupied different sections within the territories on a rotation basis, remaining in a section for about a week and then shifting to another. Except on very cold mornings, birds left the roost site at dawn and started foraging immediately.

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Altitudinal distributions of congeneric montane forest bird species along an elevational gradient in the Rwenzori Mountains National Park, western Uganda

Morten Dehn and Lars Christiansen

In a review of the altitudinal distribution of congeneric species, Cody (1974) found that tropical congeners tend to replace each other without overlap, while there were broad overlapping sequences in temperate zones. Elevational segregation in the altitudinal distribution of congeneric species was found by Terborgh (1971) in the Peruvian Andes, by Diamond (1972) in the Eastern Highlands of New Guinea, by Prigogine (1980) in the Itombwe Forest of Zaire (Democratic Republic of Congo) and by Willard *et al.* (1998) in the Rwenzori mountains. However, studies by Medway (1972) on Gungong Benom in Malaysia, Goodman & Gonzales (1990) on Mt Isaroq in the Philippines and Navarro (1992) on Sierra Madre Del Sur in Mexico found no such segregation.

In this paper we present the results from our study of bird species in the montane forest of the Rwenzori Mountains National Park (RMNP), which show that the altitudinal distributions of congeneric species tend to overlap.

Study areas, methods and effort

The Rwenzori Mountains are located on the border between Uganda and the Democratic Republic of Congo (Dehn & Christiansen 2001a) and form part of the rift-edge mountains of the western branch of the Great Rift Valley. Forest-covered areas are generally found above 1800 m in the national park, and this remaining forest is unique in Uganda as it is virtually undisturbed by man (Howard 1991).

Our fieldwork (111 days) took place between 30 July and 1 December 1996 in Bundibugyo and Kasese Districts, Uganda (Dehn & Christiansen 1998, 2001a, 2001b). An initial 12-day survey on the Kakuka Ridge was carried out to find out at what altitude montane forest occurred, and in preparation for the more detailed survey in the Mubuku/Mahoma/Bujuku valleys. Montane forest in the Mubuku/Mahoma/Bujuku valleys extends continuously from 1800 m to the treeline at about 3000 m. Standardised survey work was carried out in 1-ha study plots (50 m x 200 m) at 1800 m, 2100 m, 2400 m,

2700 m and 3000 m. Study plots were constructed by cutting a perimeter trail and one central trail, placed in an east-west direction. Elevations were measured with altimeters after calibration at known altitudes.

Mist-netting and observations were carried out daily between 06:00 and 11:00, but only during periods without rain. After trail-cutting, study plots were left undisturbed for at least 24 hours. Mist-nets were placed along the perimeter trails of the study plots and checked every 45 minutes. At each plot we ran an equal number of net metre-hours (mh) over a four-day period, and changed the net positions once. We used 5 x 12-m and 7 x 9-m nets of mesh size 32 mm. Ad-hoc mist-netting was also carried out on the Kakuka Ridge and between study plots in the Mubuku River system. Captured birds were colour-marked so that we could recognise recaptured individuals. In each plot we made observations according to the McKinnon & Phillips (1993) 20-species list method, slowly walking along the trails between 06:00 and 11:00 over four mornings. Relative species abundances were estimated by counting the number of times each species appeared on all the lists from each study site (further details can be found in Dehn & Christiansen (1998)).

We classed species into abundance categories based on the number of observations, and on the number of individuals mist-netted. These are used only to give a broad idea of relative abundance; obviously, the abundance category will depend on the conspicuousness of the species, among other factors.

Nomenclature (scientific/English names) and order used in this paper follow *The birds of Africa* series (London: Academic Press) or (for species not yet covered by *The birds of Africa*) Britton (1980).

Results

We identified 139 species of which 17 were new records for the RMNP (Dehn & Christiansen 2001a). Mist-netting totalled 28,200 mh, with 991 birds captured. This included approximately 15,900 mh with 473 captures (0.029 birds/mh) during the twelve days of preparatory work on the Kakuka Ridge (western slope), and 12,300 mh, with 438 birds netted (0.035 birds/mh) in standardised mist-netting along the Mubuku River System (eastern slopes). Thirty-five of the birds ringed along the Mubuku River System were recaptured, all at the initial capture site.

We recorded 21 congeneric groups involving 55 species (Table 1). Two species in the genus *Musophaga* were clearly segregated by altitude, showing a hiatus (*sensu* Terborgh 1971, a gap between pairs of replacing species). The two *Phylloscopus* species also showed no altitudinal overlap. Congeneric species in six genera (*Accipiter*, *Turtur*, *Dendropicos*, *Terpsiphone*, *Laniarius* and *Estrilda*) showed only a narrow overlap. There was broad altitudinal overlap between congeneric species in the remaining thirteen genera (*Chrysococcyx*, *Pogoniulus*, *Andropadus*, *Cossypha*, *Bradypterus*, *Apalis*, *Muscicapa*, *Batis*, *Onychognathus*, *Nectarinia*, *Ploceus*, *Cryptospiza* and *Serinus*).

Sixteen of the 55 species treated here are considered to belong to superspecies (Britton 1980). Four species in the *Cryptospiza* species-group occur in the Rwenzori. On the Kakuka ridge we captured five *Cryptospiza reichenovii* (between 1920 m and 2035 m) and twelve *C. salvadorii ruwenzorii* (between 1960 m and 2050 m). In the Mubuku/Mahoma/Bujuku valleys we observed altitudinal overlap between *C. reichenovii*, *C. shelleyi* and possibly *C. salvadorii kilimensis* (see Table 1 and footnote to the table). The surveys by Willard *et al.* (1998) in the Rwenzori were carried out at slightly different altitudes than our study and their results further extend the altitudinal distributions for 23 species in our study (Table 1).

Discussion

Most congeneric species in the Rwenzori had a sympatric distribution, at least in part, with substantial areas of altitudinal overlap. There was little clear altitudinal replacement between species pairs with altitude.

According to Britton (1980), *C. salvadorii* is virtually allopatric to *C. reichenovii*, and is found mainly or entirely segregated by altitude in the few areas of apparent sympatry. But on Mt Meru and Mt Kilimanjaro, these two species are sympatric (Zimmerman *et al.* 1996). Our results from Kakuka show that *C. salvadorii* and *C. reichenovii* coexist between 1960 m and 2035 m.

As examples of possible congeneric replacements in the Rwenzori Mountains, Willard *et al.* (1998) mention *Tauraco*, *Cossypha*, *Bradypterus*, *Apalis*, *Phylloscopus*, *Laniarius* and *Cryptospiza*. Some of the species in these genera do appear to replace each other gradually along the altitudinal gradient, but no pairs are completely allopatric.

Our plots were separated altitudinally by 300 m and we could therefore not resolve questions about species ranges that met or overlapped within these intervals. An example is the two *Phylloscopus* species, Red-faced Woodland Warbler *P. laetus* and Brown Woodland Warbler *P. umbrovirens*. Members of the 1905–1906 Ruwenzori Expedition (Ogilvie-Grant 1910) found *P. laetus* between 1830 m and 2740 m and *P. umbrovirens* between 3050 m and 4270 m. Britton (1980) also reported that *P. umbrovirens* is segregated from its congeners at higher elevations in areas of apparent sympatry. We observed *P. laetus* up to 2700 m and *P. umbrovirens* at 3000 m. However, Willard *et al.* (1998) captured both species at 2700 m (*P. laetus* at 1960–2700 m and *P. umbrovirens* at 2700–4000 m). The evidence suggests that these two species only meet at about 2700 m.

We observed *Musophaga rossae* only once during 23 days at 1800 m in the Mubuku Valley (two birds seen at the forest margin). Francis & Penford (1991), who carried out most of their fieldwork in the Rwenzori at altitudes above 1670 m, did not record *M. rossae*; neither did the members of the Ruwenzori Expedition (Ogilvie-Grant 1910). Apparently *M. johnstoni* coexists with other turaco species without any signs of aggression (Fry *et al.* 1988, from Prigogine 1971). In the Mahoma Valley we observed small groups of

Table 1. Altitudinal distributions of 55 species (21 groups of congeners) in the Mubuku/Mahoma/Bujuku valleys. Abundance categories have been divided into A) >100, B) 50–99, C) 10–49, D) 1–9 observations (1 mist-net capture = 1 observation). For the study by Willard *et al.* (1996) abundance is indicated by I = 1 capture, II = 2–5 captures, III = 6–10 captures, IV = 11–20 captures, V = >20 captures and 'sro' = sight record only. Bold lettering (sro, I, II, III, IV) indicates a range extension or range overlap compared to our study

Scientific name	Altitude (m)									
	Dehn & Christiansen					Willard <i>et al.</i> (1998)				
	1800	2100	2400	2700	3000	1960	2075	2700	3400	4000
<i>Accipiter tachiro</i>	D	D	—	—	—	—	—	—	—	—
<i>A. rufiventris</i>	—	—	—	D	—	—	—	—	—	—
<i>A. melanoleucus</i>	—	D	D	D	—	—	—	sro	sro	—
<i>Chrysococcyx cupreus</i>	D	D	—	—	—	—	—	—	—	—
<i>C. klaas</i>	C	D	—	—	—	—	—	—	—	—
<i>Musophaga johnstoni</i>	—	—	C	B	C	—	—	I	I	—
<i>M. rossae</i>	D	—	—	—	—	—	—	—	—	—
<i>Pogoniulus coryphaeus</i>	D	D	D	D	—	III	—	—	—	—
<i>P. bilineatus</i>	A	A	C	—	—	II	II	—	—	—
<i>Turtur tympanistria</i>	C	D	D	—	—	IV	II	—	—	—
<i>T. afer</i>	D	—	—	—	—	—	—	—	—	—
<i>Dendropicos fuscescens</i>	D	D	—	—	—	—	—	—	—	—
<i>D. griseocephalus</i>	—	D	D	—	—	—	—	sro	—	—
<i>Andropadus tephrolaemus</i>	—	A	A	A	C	IV	V	V	—	—
<i>A. latirostris</i>	A	A	D	—	—	V	V	II	—	—
<i>Cossypha archeri</i>	D	D	C	B	B	—	II	IV	III	—
<i>C. polioptera</i>	C	D	—	—	—	—	—	—	—	—
<i>C. cyanocampter</i>	D	D	—	—	—	II	—	—	—	—
<i>Bradypterus lopezi</i>	C	D	—	—	—	II	II	—	—	—
<i>B. cinnamomeus</i>	D	C	B	A	A	—	III	IV	II	—
<i>Apalis ruwenzori</i>	C	C	A	A	A	IV	III	IV	—	—
<i>A. flavida</i>	D	—	—	—	—	—	—	—	—	—
<i>A. personata</i>	B	B	B	D	—	III	III	—	—	—
<i>A. porphyrolaema</i>	—	B	B	B	—	—	I	II	—	—
<i>Phylloscopus laetus</i>	—	D	C	B	—	sro	III	III	—	—
<i>P. umbrovirens</i>	—	—	—	—	C	—	—	II	II	sro
<i>Muscicapa caerulescens</i>	D	D	D	D	—	—	—	—	—	—
<i>M. adusta</i>	D	D	D	D	D	I	III	III	—	—
<i>Terpsiphone viridis</i>	B	—	—	—	—	II	—	—	—	—
<i>T. rufiventer</i>	D	D	—	—	—	—	—	—	—	—
<i>Batis diops</i>	—	—	C	C	—	—	II	III	—	—

Table 1. Continued.

Scientific name	Altitude (m)									
	Dehn & Christiansen					Willard et al. (1998)				
	1800	2100	2400	2700	3000	1960	2075	2700	3400	4000
<i>B. molitor</i>	—	C	C	C	—	—	—	—	—	—
<i>Laniarius fuelleborni</i>	—	D	C	B	C	—	III	IV	—	—
<i>L. luehderi</i>	C	C	—	—	—	III	—	—	—	—
<i>Onychognathus tenuirostris</i>	C	C	C	D	C	III	sro	sro	—	—
<i>O. walleri</i>	—	D	—	—	—	—	—	—	—	—
<i>Nectarinia alinae</i>	C	C	C	D	—	V	V	V	—	—
<i>N. preussi</i>	A	B	—	—	—	III	III	I	—	—
<i>N. purpureiventris</i>	—	C	B	D	—	II	II	—	—	—
<i>N. regia</i>	—	D	A	A	A	II	V	V	—	—
<i>N. stuhlmanni</i>	—	D	D	D	A	—	II	V	V	—
<i>N. venusta</i>	—	D	D	A	—	I	II	II	—	—
<i>Ploceus alienus</i>	D	C	D	D	D	V	III	III	—	—
<i>P. baglafecht</i>	D	D	D	—	—	—	II	—	—	—
<i>P. insignis</i>	D	D	D	—	—	I	—	—	—	—
<i>P. nigriceps</i>	D	—	—	—	—	—	—	—	—	—
<i>Cryptospiza jacksonii</i>	D	D	D	D	—	IV	III	II	—	—
<i>C. reichenovii</i>	D	*	D	—	—	II	—	—	—	—
<i>C. shelleyi</i>	—	D	D	D	D	II	I	III	I	—
<i>Serinus burtoni</i>	—	—	D	D	—	II	III	III	—	—
<i>S. citrinelloides</i>	D	D	D	D	—	II	—	V	—	—
<i>S. striolatus</i>	—	C	D	C	D	IV	II	IV	III	sro
<i>Estrilda melanotis</i>	D	D	D	—	—	sro	I	I	—	—
<i>E. nonnula</i>	D	—	—	—	—	I	—	—	—	—

*Species uncertain; the single bird netted was either *C. reichenovii* or *C. salvadorii kilimensis* — a darker bird than *C. s. ruwenzorii* and with conspicuous red eyelids. This record is under review by the East African Rarities Committee.

M. johnstoni in company with Black-billed Turacos *Tauraco schuetti* (observed at 1800 m, 2100 m and 2400 m) without any signs of agonistic behaviour. This sympatric distribution is locally common in forests of the Rwenzori between 2200 m and 3400 m (Fry et al. 1988). At around 2740 m *T. schuetti* is replaced by *M. johnstoni* (Ogilvie-Grant 1910). *Musophaga johnstoni* is reported to be most common in the Rwenzori at about 3000 m (Fry et al. 1988), but we found it most abundant around 2700 m, as did the Ruwenzori Expedition (Ogilvie-Grant 1910). Altitudinal movements in response to periods of heavy rain might explain this shift in abundance (K. Flavienius, pers. comm.).

Most sunbird species are active, easily observed and frequently mist-netted. Sunbirds are therefore suitable for studies of altitudinal distribution

where observation or capture is necessary. Britton (1980) report the Blue-headed Sunbird *N. ulinae* to be common in the Rwenzori at 1400–2100 m, and perhaps Kingdon (1990) used the ranges provided by Britton to construct his model of the stacking of the three sunbird lineages. In Kingdon's model, *N. alinae* is confined to altitudes between 1600 m and 2100 m, but we found this species was common in the Rwenzori up to 2700 m. *Nectarinia preussi* and *N. regia* also occurred over larger altitudinal ranges than Kingdon suggests, and generally the sunbirds were found to have broad overlapping distributions.

The *Apalis* species were vocally conspicuous throughout the transect. We only once captured the Chestnut-throated Apalis *Apalis porphyrolaema* and the Montane Apalis *A. personata* (the latter species is considered a race of *A. binotata* in Britton (1980)). The Collared Apalis *A. ruwenzorii* was common in the undergrowth and therefore frequently captured (49 birds netted). There were only a few scattered trees (< 12 m tall) in the study plot at 3000 m, and both *A. porphyrolaema* and *A. personata* appeared to be absent at this altitude. *Apalis porphyrolaema* may well have been present at 1800 m, but we were unfamiliar with its cicada-like call until we reached our plot at 2100 m. Willard *et al.* (1998) also found *A. porphyrolaema* up to 2700 m, and missed this species at their lowest altitude, 1960 m. Yellow-breasted Apalis *A. flava* was only observed once in the Mubuku Valley, at the forest edge ecotone, but was captured inside the forest at 1970 m on the Kakuka Ridge.

It appears that altitudinal range overlaps among congeneric species is the rule rather than the exception in the montane forest of the Rwenzori Mountains National Park. This pattern of overlapping ranges among congeners is even more pronounced when we combine our results with those from the surveys by Willard *et al.* (1998).

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Birds of Mgambo Proposed Forest Reserve and other East Usambara lowland sites

Norbert J. Cordeiro and Mwangi Githiru

Mgambo Proposed Forest Reserve (hereafter PFR), previously unknown biologically, was surveyed in 1996 as part of a larger investigation of two poorly known habitats in the East Usambara lowlands, Tanzania. We visited three other reserves for the same purpose, but report on them elsewhere because their habitat similarities and conservation importance warrant separate coverage. In this paper, we provide an account of the avifauna of Mgambo PFR and supplement this information with bird records of interest from the other East Usambara lowland sites.

Montane and lowland forests of the East Usambaras have received considerable biological and conservation attention over the last decade (briefly reviewed in Cordeiro & Githiru 2000). These studies have provided important baseline data for the conservation of biodiversity in this unique area of Tanzania. Part of this uniqueness is revealed through the numerous endemic forms, such that two Endemic Bird Areas (EBAs) are recognised here: the East African coastal forests EBA and the Tanzania-Malawi mountains EBA (Stattersfield *et al.* 1998).

A good deal is now known about montane and lowland forest birds in the East Usambaras. However, birds from woodland habitats have been notably neglected. To address this deficiency, we visited four forest reserves from August to October 1996, chiefly for ornithological surveys (summarised in Cordeiro & Githiru (1998)). Three sites in the Bombo Valley, Bombo West FR and Bombo East I & II PFRs, consisted mainly of mixed dry forest and *Brachylaena* woodland. They generally supported bird communities different from those of lowland forest habitats. We have reported on the findings for birds of conservation concern at these three particular sites elsewhere (Cordeiro & Githiru 2000).

Among other habitats, Mgambo PFR comprises riverine forest (closely resembling groundwater forests in the area) and *Brachystegia* woodland. It is distinct in nature both from the other woodland sites and the lowland forest. Here we present the most significant records from Mgambo PFR and provide short annotated accounts of bird species of interest from all four sites, emphasising taxa not discussed in Cordeiro & Githiru (2000). Several new records for the area were made during this study: where descriptive details are not provided here, they have been deposited with the Bird Committee of the East Africa Natural History Society.

Mgambo Proposed Forest Reserve

Hamilton & Bensted-Smith (1989) describe the physical geography of the East Usambara mountains, and Cordeiro & Githiru (2000) describe the Bombo Valley forest reserves. Here we give a brief description of Mgambo PFR ($04^{\circ}46' S$, $38^{\circ}48' E$). It is located several kilometres north of Mtai FR (see Figure 1 in Evans (1997)) in Muheza District, Tanga Region, Tanzania and is 1346 ha in size (Johansson & Sandy 1996). Altitude ranges from 350–850 m. The boundary of the reserve, surveyed in 1995, was being marked at the time of this study. The main habitats are riverine forest, *Acacia* woodland and, at the top of the easternmost hill, a small patch of *Brachystegia* woodland. The *Brachystegia* has a closed canopy that is 10–20 m high in some places, but generally lacks a developed understorey layer, characteristics that typify Eastern African coastal *Brachystegia* forest (Clarke & Robertson 2000). In the midst of the *Brachystegia* woodland is a tiny patch of forest with a thick understorey. Canopy height of the *Acacia* woodland varies from 3–15 m and bushes, shrubs and grasses dominate this habitat. Trees in the riverine forest, with a canopy height of 10–35 m, include *Ficus* spp., *Albizia* spp., *Newtonia* spp., *Craibia zimmermannii*, *Sorindeia madagascariensis* and *Cordia* spp. The understorey is often dense with saplings and shrubs, including at least two euphorbiaceous species. Small submontane forest patches (which we did not survey) exist on hills at the southern extreme of this reserve.

Small springs, rivers and seasonal streams draining the forest, although few, serve as the source of water for several villages in the area.

Methods

Mgambo PFR was visited from 27 August to 9 September 1996, whereas Bombo East I PFR and Bombo West FR/Bombo East II PFR were surveyed from 10–30 September and 30 September–10 October, respectively. General survey methods for Mgambo were identical to those at the Bombo Valley sites and are detailed in Cordeiro & Githiru (2000). Mist-netting and audio-visual observations were carried out in Mgambo, with particular emphasis on the *Brachystegia* woodland and riverine forest where certain species of conservation concern were expected to occur. Capture effort comprised 5176 (diurnal) and 5952 (nocturnal) net metre hours (m h) for the riverine forest and 144 (diurnal) and 288 (nocturnal) net m h for the *Brachystegia* woodland habitat.

Results

Forty-three species were recorded primarily from the riverine forest and *Brachystegia* woodland (Table 1) and a further 66 in surrounding *Acacia* woodland and cultivation (NC and MG, unpublished data). In total, 39 individuals representing sixteen species were captured in mist-nets: 37 in riverine forest and two in *Brachystegia* woodland. Grey-olive Greenbul

Phyllastrephus cerviniventris, Red-capped Robin-chat *Cossypha natalensis*, African Paradise Flycatcher *Terpsiphone viridis*, Forest Batis *Batis mixta*, and Olive Sunbird *Nectarinia olivacea* were the most frequently captured species.

Species previously unknown from this area

The following species were not indicated to occur in this area in the maps or text of Zimmerman *et al.* (1996): Banded Snake Eagle *Circaetus cinerascens*, Steppe Eagle *Aquila nipalensis*, Thick-billed Cuckoo *Pachycoccyx audeberti*, Wahlberg's Honeybird *Prodotiscus regulus*, Nubian Woodpecker *Campetherina nubica*, Bearded Woodpecker *Dendropicos namaquus*, Grey-olive Greenbul *Phyllastrephus cerviniventris*, White-browed Scrub Robin *Cercotrichas leucophrys*, Abyssinian White-eye *Zosterops abyssinicus*, Pygmy Batis *Batis perkeo*, White-crested Helmet-shrike *Prionops plumatus*, Sulphur-breasted Bush-shrike *Malaconotus sulfureopectus*, Hunter's Sunbird *Nectarinia hunteri*, Yellow-spotted Petronia *Petronia pyrgita* and Jameson's Firefinch *Lagonosticta rhodopareia*.

Another seven species recorded from our study area were specifically listed as 'scarce', 'rare' or absent in the Usambara mountains and/or environs by Zimmerman *et al.* (1996). These were: Blue-spotted Wood Dove *Turtur afer* (several individuals, eastern reserve boundary of Mgambo PFR, and near the village of Bwiti); Emerald-spotted Wood Dove *T. chalcospilos* (common at all sites, found mainly in open woodland, not in forest); Arrow-marked Babbler *Turdoides jardineii* (not uncommon in *Acacia* woodland and cultivation with thicket and grass cover in environs of all sites); Spotted Morning Thrush *Cichladusa guttata* (two observed in Bombo Valley); Red-winged Starling *Onychognathus morio* (fair numbers in Mgambo and Bombo East I PFRs, flocks of 5–40 birds); Red-headed Weaver *Anaplectes rubriceps* (two pairs, *Acacia* woodland in Bombo Valley sites); African Firefinch *Lagonosticta rubricata* (not uncommon from 350–600 m at all sites; see below).

Other species of interest

Banded Snake Eagle *Circaetus cinerascens* An individual was observed at the edge of Bombo East II PFR flying above a nesting pair of Southern Banded Snake Eagles *C. fasciolatus* on 13 September (Cordeiro & Githiru 2000). It was distinguished from *fasciolatus* by the brown extending from chin to belly and by tail pattern: a single white band separating two wide blackish bands.

Southern Banded Snake Eagle *Circaetus fasciolatus* In addition to our records in the Bombo Valley (Cordeiro & Githiru 2000) and other documentation of this raptor in the East Usambara lowlands (CTR 1994, Evans 1997), we observed possible breeding activity in September at Mgambo PFR — a pair calling and displaying in dense riverine forest.

Steppe Eagle *Aquila nipalensis* On 8 October, one juvenile was observed gliding downwards over Bombo West FR, landing on the hill in Bombo East II PFR where it remained on a dead tree for several minutes. This species has not previously been reported from the coastal area, but stragglers might occasionally turn up given its presence in nearby Mkomazi and Tsavo (Zimmerman *et al.* 1996).

Sooty Falcon *Falco concolor* Known from the Amani area where it was reported as an infrequent visitor from October to March (Sclater & Moreau 1932–33). An individual was observed gliding slowly over *Acacia* woodland and into the *Brachylaena* woodland (Bombo West FR) at 18:25 on 1 October. It was differentiated from Grey Kestrel *F. ardosiaceus* (not known from this area) by the presence of a yellowish cere, pale chin, and a thin long tail, which was strongly wedge-shaped due to the longer central tail feathers. It fanned its tail feathers, making the shape more distinctive.

Thick-billed Cuckoo *Pachycoccyx audeberti* Despite significant coverage in the East Usambaras where its host, Retz's Helmet-shrike *Prionops retzii*, commonly occurs (e.g. Stuart 1989, Evans 1997), this cuckoo was previously unknown in the area until our survey. We recorded only one individual in the hill-top *Brachystegia* woodland in Mgambo PFR on 4 September. Its presence was initially revealed by its loud, distinctive calls and unusual raptor-like gliding in circles, followed by landing in the open canopy where it generally perched on bare outer branches. In Kenya it is known from the Arabuko-Sokoke Forest, and more recently from the Taita Hills (Githiru 1999).

African Barred Owlet *Glaucidium capense* Noted from the foothills of the West Usambaras at Mombo (Sclater & Moreau 1932–33), and not reported from the East Usambaras by Zimmerman *et al.* (1996); however, it was recorded from there by Cambridge Tanzania Rainforest Project (CTR 1994). Besides the record from Kwamgumi (CTR 1994), Evans (1997) notes it from Longuza FR. Although none was heard in the *Brachystegia* woodland in Mgambo PFR, they occurred at high density in the thick riverine habitat: at least six individuals were heard calling from an area of around 1 km². Densities in Bombo East I PFR and Bombo West FR (each almost three times the area of Mgambo) appeared to be lower, with three to four and about five heard, respectively. Birds at all sites responded to playback and vocal imitations, but were very hard to observe when brought in close (cf. Fanshawe & Ngala 1994). This owl is clearly widespread in this area of the East Usambara lowlands and may occur in the *Brachylaena* woodlands north of the Bombo Valley.

Wahlberg's Honeybird *Prodotiscus regulus* Only one individual was observed, just outside Mgambo PFR in dry *Acacia* woodland.

Table 1. Species found primarily in the riverine forest and associated riparian vegetation and *Brachystegia* woodland (Br) in Mgambo PFR. Species that foraged above these two habitats are marked *.

Species	Notes
Southern Banded Snake Eagle <i>Circaetus fasciolatus</i>	
African Goshawk <i>Accipiter tachiro</i>	
African Crowned Eagle <i>Stephanoaetus coronatus</i>	
Crested Guineafowl <i>Guttera pucherani</i>	
Tambourine Dove <i>Turtur tympanistria</i>	
Red-eyed Dove <i>Streptopelia semitorquata</i>	
Fischer's Turaco <i>Tauraco fischeri</i>	
Thick-billed Cuckoo <i>Pachycoccyx audeberti</i>	Br (550 m)
Yellowbill <i>Ceuthmochares aereus</i>	
African Barred Owlet <i>Glaucidium capense</i>	(below 500 m)
African Wood Owl <i>Strix woodfordii</i>	
Narina Trogon <i>Apaloderma narina</i>	
African Pygmy Kingfisher <i>Ispidina picta</i>	*
Mottled Spinetail <i>Telacanthura ussheri</i>	*
Mottled Swift <i>Apus aequatorialis</i>	*
Trumpeter Hornbill <i>Bycanistes bucinator</i>	
Silvery-cheeked Hornbill <i>B. brevis</i>	(400 m)
Crowned Hornbill <i>Tockus alboterminatus</i>	
Scaly-throated Honeyguide <i>Indicator variegatus</i>	
Pallid Honeyguide <i>I. meliphilus</i>	
Mombasa Woodpecker <i>Campethera mombassica</i>	
Striped Pipit <i>Anthus lineiventris</i>	Br
Black Rough-wing <i>Psalidoprocne pristoptera</i>	
Grey-olive Greenbul <i>Phyllastrephus cerviniventris</i>	(300-500 m)
Red-capped Robin-chat <i>Cossypha natalensis</i>	
Eastern Nicator <i>Nicator gularis</i>	
Eastern Bearded Scrub Robin <i>Cercotrichas quadricincta</i>	
Ashy Flycatcher <i>Muscicapa caerulescens</i>	
Grey-backed Camaroptera <i>Camaroptera brachyura</i>	
Black-headed Apalis <i>Apalis melanocephala</i>	
African Paradise Flycatcher <i>Terpsiphone viridis</i>	
Forest Batis <i>Batis mixta</i>	
Pale Batis <i>B. soror</i>	Br
Retz's Helmet-shrike <i>Prionops retzii</i>	
Tropical Boubou <i>Laniarius aethiopicus</i>	
Black-backed Puffback <i>Dryoscopus cubla</i>	
Black-bellied Starling <i>Lamprotornis corruscus</i>	
Collared Sunbird <i>Anthreptes collaris</i>	
Plain-backed Sunbird <i>A. reichenowi</i>	(below 500 m)
Olive Sunbird <i>Nectarinia olivacea</i>	
Green-backed Twinspot <i>Mandingoa nitidula</i>	
Peters's Twinspot <i>Hypargos niveoguttatus</i>	
Red-headed Bluebill <i>Spermophaga ruficapilla</i>	(400 m)

Mombasa Woodpecker *Campether a mombassica* Apart from the Bombo Valley sites (Cordeiro & Githiru 2000), we very infrequently saw or heard this species in *Brachystegia* woodland in Mgambo PFR.

Nubian Woodpecker *Campether a nubica* This woodpecker was not uncommon at the margins of *Brachylaena* woodland and in *Acacia* woodland in and around Bombo West FR and Bombo East I PFR. It was distinguished from the race *scriptoricauda* of Bennett's Woodpecker *Campether a bennettii* by its white and not speckled throat and its grey-black bill (mandible not pinkish or yellowish as in *scriptoricauda*). Black spotting on the chest and whitish spotting on dorsal parts pointed to the race *pallida*, but birds were not unequivocally separable from the nominate race which occurs nearby (Zimmerman *et al.* 1996). It is of interest that Moreau (1935), in his natural history summary of East and West Usambara birds, mentions *C. bennettii scriptoricauda* as a savannah woodpecker and *C. nubica pallida* as the *Acacia* 'thorn country' woodpecker. While stating that both these habitats surround these mountains, he does not indicate particular localities for each of these species. Specimens from his collection need to be examined for further verification of these species' occurrences in the Usambara lowlands.

Bearded Woodpecker *Dendropicos namaquus* A large male was observed foraging at mid-storey to canopy level in a fire-hit area of *Acacia* woodland in the western part of Bombo East I PFR on 29 September.

African Broadbill *Smithornis capensis* At least three separate territorial individuals were located in Bombo East I PFR, inside dense mixed dry forest.

Striped Pipit *Anthus lineiventris* This localised species was observed once and another was netted in *Brachystegia* woodland atop a rocky hill in Mgambo PFR, at altitudes of 500–550 m. This is lower than the 1000–2000 m altitude range recorded elsewhere in East Africa (Britton 1980).

Grey-olive Greenbul *Phyllastrephus cerviniventris* This species is poorly known, with a rather patchy distribution in East Africa, being partial to riparian habitats or groundwater forests (Britton 1980, Zimmerman *et al.* 1996). The records from riverine forest in Mgambo PFR are the first for the East Usambara lowlands; it has been previously noted from Mombo, which lies at the foot of the West Usambaras (Slater & Moreau 1932–33). It is conceivable that this species occurs in several unexplored groundwater forest patches at the feet of the Usambara mountain range.

Northern Brownbul *P. strepitans*, **Terrestrial Brownbul** *P. terrestris* and **Fischer's Greenbul** *P. fischeri*: Birds in the *terrestris-strepitans* species pair recorded by Evans (1997) in the East Usambara lowland forest could not be assigned to species. Moreau (1935) and Stuart (1989) only recorded *terrestris* from the area, although there are records of *strepitans* from nearby Tanga (Slater & Moreau 1932–33) and Mafi Mt (see Evans 1997). Both species were found in the Bombo valley sites; however, *strepitans* was more of an edge and

open woodland species whereas *terrestris* preferred the dense understorey of mixed dry forest or *Brachylaena* woodland.

Both *fischeri* and *terrestris* were observed more often in the mixed dry forest than in the *Brachylaena* woodland. The two species were found together in mixed feeding parties, particularly in Bombo East I PFR.

Tiny Greenbul *P. debilis* Previously known from several East Usambara lowland sites (Evans 1997). Although not recorded in pure *Brachylaena* stands in Bombo West FR, the coastal race *rabai* of this greenbul was found in some numbers at Bombo East I PFR. It favoured the mixed dry forest, but also foraged in adjacent *Brachylaena* stands. It was recorded in mixed species flocks with *terrestris* and *fischeri*.

White-browed Scrub Robin *Cercotrichas leucophrys* This was an uncommon resident of scrubby habitat in the Bombo Valley, often announcing its presence by melodiously singing from the top of bushes or small trees, though usually remaining concealed in foliage.

Black-and-white Flycatcher *Bias musicus* A pair was observed in a *Ficus* tree along the Bombo River, just outside Bombo East I PFR. Other nearby populations of this species have been found at Kwemkole at the base of Mt Lutindi (Cordeiro 1998) and in Mtai FR, where it was infrequently encountered in 1990 (Evans & Anderson 1992).

Abyssinian White-eye *Zosterops abyssinicus* A small flock (7–8) of this species was observed in dry *Acacia* woodland in the central parts of Bombo West FR on 9 October.

Pygmy Batis *Batis perkeo* Only recently added to the Tanzanian check-list from the nearby Mkomazi area (Lack 1994), this dry country batis was observed in pairs on three occasions, once in *Acacia* woodland just outside the western portion of Bombo East I PFR and twice in Bombo West FR (possibly the same pair, in *Acacia* woodland and in the ecotone between this habitat and *Brachylaena* woodland). Given its close similarity to the other two batises in the area, Pale Batis *B. soror* and Black-headed Batis *B. minor*, careful note needs to be made of the physical differences. The females of both of the confusing species have a cinnamon-tawny throat patch as well as a breast band, a feature lacking in the smaller *B. perkeo*.

White-crested Helmet Shrike *Prionops plumatus* A flock of 15–20 birds of the race *poliocephalus* was found foraging on the burnt ground in *Acacia* woodland in the western part of Bombo East I PFR on 29 September.

Sulphur-breasted Bush-shrike *Malacorhynchus sulfureopectus* Zimmerman et al. (1996) do not map this bush-shrike in the East Usambara area. Slater & Moreau (1932–33) mention it for north-east Tanzania, while Moreau (1935) notes it as a savannah species around the Usambaras; neither specifies a locality. Most of our records came from the dry *Acacia* woodland in Bombo

West FR and Bombo East II PFR, and it seldom visited the periphery of the denser *Brachylaena* woodland.

Plain-backed Sunbird *Anthreptes reichenowi* Well-known from the East Usambara lowland forests (Evans 1997). Five individuals (two females, three males) were observed together with Black-headed Apalises *Apalis melanocephala* and Collared Sunbirds *Anthreptes collaris* gleaning insects off the flowers in a single flowering tree in Mgumbo PFR.

Hunter's Sunbird *Nectarinia hunteri* We saw this species, probably the same male, three times, as it visited flowering *Acacia* trees just bordering the western section of Bombo East I PFR. This semi-arid area forms a link to the arid belts of the Mkomazi and Tsavo, so the presence of several dry-country species here is no great surprise. Scarlet-chested Sunbird *N. senegalensis*, with which *N. hunteri* is allopatric (Britton 1980, Zimmerman *et al.* 1996), was only encountered in cultivation about 12 km south of Bombo East I PFR (Cordeiro 1998).

Yellow-spotted Petronia *Petronia pyrgita* Not reported from the coastal areas south of the Sabaki River in Kenya and regarded as absent from the Usambara mountains (Zimmerman *et al.* 1996). Several individuals were observed in the *Acacia* woodland around or in Bombo East II PFR and Bombo West FR.

Red-headed Weaver *Anaplectes rubriceps* At least two pairs were observed, one in a fire-hit zone of *Acacia* woodland in Bombo East I PFR and the other in *Acacia* woodland in and around Bombo East II PFR and Bombo West FR.

Red-headed Bluebill *Spermophaga ruficapilla* Evans (1997) summarizes his most recent observations of this finch in the Usambara lowlands. The record of a pair in dense riverine forest at Mgumbo PFR is the most northerly so far of the sub-species *cana*.

Jameson's Firefinch *Lagonosticta rhodopareia* and **African Firefinch** *L. rubricata* Both species were located at Mgumbo PFR and in the Bombo Valley. The stockier *rubicata* preferred dense grassy, hillside vegetation, while the smaller and more slender, tree-perching *rhodopareia* was encountered (rarely) feeding in areas of bare ground amongst grassy tussocks, close to tall trees with dense foliage. *L. rhodopareia* was previously unknown from the area whereas *rubicata* was believed to be scarce (Zimmerman *et al.* 1996); however, with our records and those from the slopes of Mt Nilo (Cordeiro 1998), it seems likely that *rubicata* is not uncommon in hilly, rocky terrain with adequate grass cover in the East Usambaras.

Discussion

Avifauna of Mgambo PFR

In general, the forest avifauna of Mgambo PFR was impoverished compared to other East Usambara sites (e.g. Evans 1997) or to mixed dry forests in the Bombo Valley sites (Cordeiro & Githiru 2000). It still appears impoverished when compared to similar elevations of lowland forest, for instance in the nearby Mtai Forest Reserve just to the south (Evans & Anderson 1992, 1993). Likely reasons for such low diversity in Mgambo PFR may relate to the small size and lack of structural diversity of the riverine forest in comparison to lowland forests like Kwamgumi and Kambai (CTR 1994, Evans 1997). Other factors including disturbance such as fires, grazing and cultivation may also interact to reduce suitable habitat for forest birds. Nevertheless, the presence of three near-threatened species of birds (Southern Banded Snake Eagle, Fischer's Turaco and Plain-backed Sunbird) illustrates the importance of these previously unexplored habitats for species of conservation concern.

The *Brachystegia* woodland in Mgambo, though only a small patch, contained a few oddities, such as the Thick-billed Cuckoo and Striped Pipit. *Brachystegia* woodland patches appear to be very scarce in north-eastern Tanzania. Local people reported further small tracts north and east of Mgambo, but these have not yet been explored biologically.

For purposes of bird conservation, Mgambo PFR is less significant than other lowland East Usambara forests, which shelter many more species of regional and global conservation concern (Evans & Anderson 1993, CTRP 1994, Evans 1997). Nevertheless, this reserve is unique in having the only protected *Brachystegia* patch in the region. Two typical *Brachystegia* inhabitants, Thick-billed Cuckoo and Pale Batis, are now known to occur, and a third, Sokoke Pipit *Anthus sokokensis*, might be located in future (see below).

New records for the area

Given the focus in recent decades on montane and lowland forest birds in the East Usambaras, it is unsurprising that this investigation of mixed dry forest and woodland yielded 16 new records for the area. The presence of arid habitat elements typical of Mkomazi Game Reserve (only about 30 km away) and Tsavo East NP is probably enabled through contiguous arid habitat extending to the environs of Bombo Valley.

We hope that our findings stimulate others to explore these habitats in more depth, perhaps with the potential of finding additional species. For example, one small pipit, heavily streaked on the breast, was located in the *Brachystegia* woodland in Mgambo PFR. However, its frequent flights when disturbed and scurrying in grass cover prevented us from identifying it to species level. The Sokoke Pipit has not yet been found in the East Usambaras, but there is every possibility that this low-density and secretive

bird occurs here, especially since it is known from north and south of these mountains (Collar *et al.* 1994). We recommend that further visits to these woodlands be made by interested ornithologists, and that priority should be given to the less accessible *Brachylaena* woodland patches north of the Bombo Valley and closer to the Kenyan border.

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An ornithological survey of the Nguru Mountains, Tanzania

Tom S. Romdal

Ornithological research in the Eastern Arc Mountains of Tanzania has so far mainly focussed on three ranges: the Usambaras (e.g., Sclater & Moreau 1932, Newmark 1991), Udzungwas (e.g., Jensen & Brøgger-Jensen 1992, Dinesen *et al.* 1993) and Ulugurus (e.g., Svendsen & Hansen 1995). Other areas remain poorly surveyed (Stuart *et al.* 1993). Despite holding a number of rare and restricted-range species, the centrally placed Nguru Mountains have received very little ornithological attention. The only comprehensive published Nguru forest bird list is found in Stuart (1981), which is a comparison of seven East African forests and lists species as present or absent without further detail. However, in an earlier report Stuart & van der Willigen (1978) include a more detailed summary of their records. Earlier explorers, such as Sclater & Moreau (1932), Fuggles-Couchman (1939, 1984), Moreau (1940) and Keith (1968) each report just a few species, while lists in Stuart *et al.* (1993) and Fjeldså & Rabøl (1995) only include the montane species.

In November and December 1996, I visited the Ngurus to collect data for my study of the altitudinal distribution and abundance patterns of Eastern Arc forest birds (Romdal 1998, Romdal 2001). I was already thoroughly familiar with the forest avifauna through fieldwork in other mountain ranges and obtained sufficient material to estimate the relative abundances of each species. This paper is a first attempt at describing the forest bird community. Much further work is needed in the area: the western parts of these mountains are still unexplored, the status of many of the rarer species is still uncertain, and severe habitat degradation is taking place.

The Nguru Mountains

The Nguru Mountains are situated centrally in the Eastern Arc Mountain chain, an assembly of faulted blocks of Precambrian crystalline gneiss dominating the eastern plains of Tanzania (Pócs *et al.* 1990, Griffiths 1993, Figure 1). North of the Ngurus lie the Nguu Mountains (or Nguru North), to the southwest lie the Ukaguru, Rubeho and Uvidunda Mountains and further away to the south lie the Uluguru Mountains. Immediately east of the Ngurus, isolated by a deep valley, lies Kanga Mountain (2020 m). The Nguru range reaches 2400 m at Mafulumula summit, a similar maximum altitude to several other Eastern Arc peaks. The terrain is generally very steep and some parts are difficult to access.

More than 120 km of relatively dry lowland savanna separates the Ngurus from the Indian Ocean to the east. However, the predominantly easterly winds provide a more or less constant flow of warm, humid air. The montane forests receive annual precipitation ranging from 2000–4000 mm with an additional and considerable mist effect and no marked dry season (Pócs *et al.* 1990, Lovett & Pócs 1993). As in other parts of the Eastern Arc, the stable climatic regime has maintained luxuriant Afromontane rain forest cover on the entire Nguru range, with around 120 km² of evergreen forest (Pócs *et al.* 1990, Fjeldså & Rabøl 1995). The escarpment rain forest can be altitudinally divided into lowland (300–900 m), submontane (900–1400 m), montane (1400–1800 m) and upper montane forest types (1800–2000 m) (Pócs *et al.* 1990, Lovett & Pócs 1993). Botanically the Ngurus are one of the richest ranges of the region with more than 40 endemic woody species and new endemic plant species still being discovered (Lovett & Pócs 1993).

Three forest reserves have been gazetted on the range, with Manyangu Forest Reserve now included in Nguru South Catchment Forest Reserve (Figure 1). Together they cover 188 km² and contain most of the submontane and montane forest. To the south, Mkindo Catchment Forest Reserve (75 km²) contains some foothill forest, while other valuable lowland forests in the eastern foothills are under local jurisdiction or unprotected (Pócs *et al.* 1990). Kanga Mountain, isolated to the east, also has protected status (Kanga Catchment Forest Reserve).

Originally, forest cover in the Ngurus was continuous down to the lowland plains. The lower slope forests are now in rapid retreat, in spite of their protected status, because of the demands for timber and agricultural land (see also Kielland 1990, Chamshama *et al.* 1990). At the time of my visit, large-scale timber felling was widespread, as well as the traditional selective pit-sawing activities. Small fields (*shambas*) of cardamom, maize or coffee are established in the cleared areas as high as 1100 m inside Nguru South Catchment Forest Reserve, and I could find no areas of contiguous forest below 800 m on the northern, eastern and southern slopes. Meanwhile, the nearby Kanga Mountain still retains intact forest below 500 m (Kielland 1990, J. Fjeldså, pers. comm.).

The survey

The eastern slopes of the Ngurus near the town of Turiani are very steep and uninviting. For that reason the census transect was situated near Nkombora (Kombola) in the northern part of Nguru South FR (Figure 1). Even here the lower parts are steep and difficult to explore. The 21-day survey (19 November–9 December 1996) was timed around the beginning of the rainy season, when most species would be breeding (Moyer 1993). Despite the short survey time, intensive censusing along the gradient made it possible to assess the relative abundance of most species. Observations were concentrated in altitudinal zones around 860, 1070, 1280, 1550, 1750 and 1950

m. All the sites were inside mature natural forest, but the two lower sites contained *shambas* in some parts. These areas were avoided when censusing.

I spent most of the daylight hours gathering abundance data of all species by random walks on existing trails or following ridges, streams, etc. in an area of approximately 1 km² (see Fjeldså 1999 for details of the method). A very small amount of mist-netting was also carried out.

Status of forest bird species

The list includes all species that I recorded inside the forest. It covers only the Ngurus and not nearby Kanga Mt. nor the Nguus, but some comparisons are made. Species not previously reported from the area are noted (most were opportunistic edge species). The actual figures of standardised bird records at each site can be found in Romdal (2001). I have included other observers' records only for species considered forest-dependent in Stuart

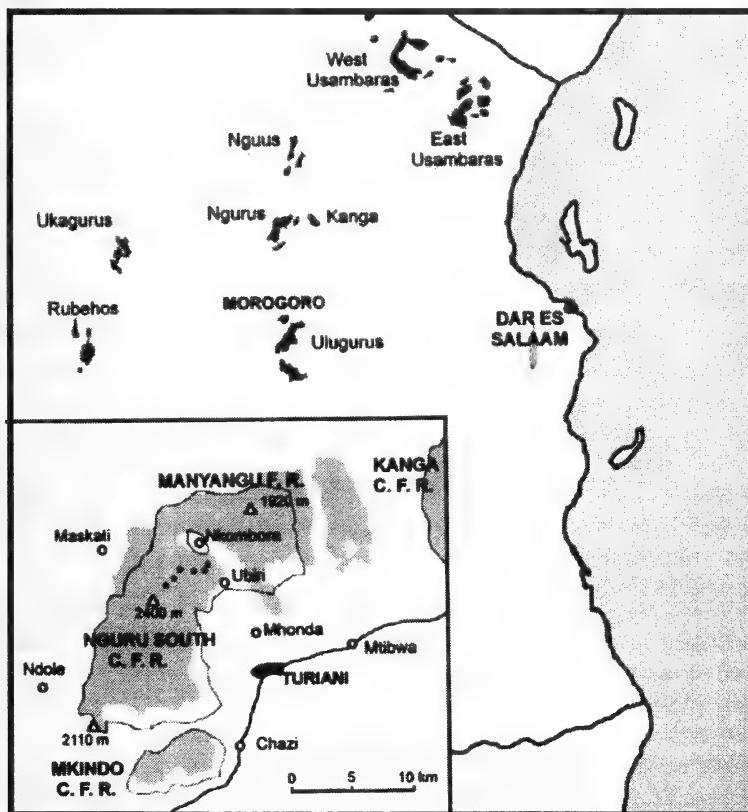


Figure 1. Map of Eastern Tanzania showing the central parts of the Eastern Arc Mountains. Inset: Nguru Mountains area. The borders of the forest reserves are shown, and shaded areas show the approximate extent of the main forest blocks. The transect of the Nguru South Catchment Forest Reserve survey is marked with asterisks.

(1981) or Bennun *et al.* (1996). In 1992 J. Fjeldså and J. Rabøl visited the eastern foothills as well as Nguru South FR. Their survey was in October, at the end of the dry season, and they encountered several species near their camp at 1000–1100 m that I only recorded at higher altitudes. Some of these are known altitudinal migrants that were possibly recorded outside breeding range (e.g. Burgess & Mlingwa *in press*), but I have mentioned them all.

Taxonomy and nomenclature follow Dowsett & Forbes-Watson (1993) supplemented by Keith *et al.* (1992) and Urban *et al.* (1997). Threat and restricted-range status follow BirdLife International (2000) or Stattersfield *et al.* (1998) respectively.

Southern Banded Snake Eagle *Circaetus fasciolatus* (Near-threatened) Not found in the survey. It seems the only 'record' is the distribution map in Snow (1978), interpreted by Stuart & van der Willigen (1978). This secretive raptor is mainly a coastal forest species, but is also present in forests along the base of Eastern Arc mountains (Brown *et al.* 1982). Interestingly Seddon *et al.* (1999) found it in submontane forest in the Nguus at 1200 and 1360 m.

African Goshawk *Accipiter tachiro* Occupies the whole gradient, though I did not find it above 1800 m. One bird was mist-netted at 960 m.

Black Goshawk *Accipiter melanoleucus* Not found in this survey, but one individual was reported in Stuart & van der Willigen (1978) above Ubiri (900 m). This is a low-density species that may be overlooked due to its retiring habits (Brown *et al.* 1982).

Little Sparrowhawk *Accipiter minullus* Not found, generally uncommon and very secretive. It was included in Stuart (1981) and recorded in foothill forest in 1992 (J. Fjeldså, pers. comm.).

Forest Buzzard *Buteo oreophilus* Found along the entire gradient, including the 860 m site. This represents an extension of altitudinal range in the Eastern Arc, where it was previously not reported below 1270 m. However, I have also seen it in the Udzungwas at 1100 m, and in southern Africa it is found near sea level (Brown *et al.* 1982).

Crowned Eagle *Stephanoaetus coronatus* Only recorded at the 1280 and 1750 m sites, but territories of individual pairs are likely to cover much of the gradient. It was also recorded regularly by Stuart & van der Willigen (1978).

Crested Guineafowl *Guttera pucherani* Common at 800–1100 m in spite of probable severe hunting pressure (hunters were seen at the same altitudes). It is surprising that this noisy bird had eluded earlier observers. It was seen in small groups, some also including chicks.

Olive Pigeon *Columba arquatrix* Not uncommon at high altitudes (from around 1700 m). It is a known altitudinal migrant, and in the dry season Stuart & van der Willigen (1978) found it to be fairly common at submontane altitudes.

Bronze-naped Pigeon *Columba delegorguei* Very common, found as low as 1050 m. Its density peaked at the 1550 m site where it was the third most common species registered.

Lemon Dove *Aplopelia larvata* This secretive bird was only seen at the 1070 m site. Fuggles-Couchman (1984) reported it from 1700 m in July 1961, and Stuart & van der Willigen (1978) report one individual. In my experience it can be easily overlooked, suddenly appearing and singing on certain days, e. g. after rain. It may well be more common than the records show.

Tambourine Dove *Turtur tympanistria* Commonly found up to 1750 m.

Livingstone's Turaco *Tauraco livingstonii* Everywhere common, found as low as 800 m but most abundant at the highest altitudes.

Barred Long-tailed Cuckoo *Cercococcyx montanus* Not uncommon at higher altitudes, and heard at the 1070 m site.

Klaas's Cuckoo *Chrysococcyx klaas* Only heard singing sporadically, at the 1550 and 1950 m sites. It has not previously been recorded from the Ngurus, but it is a woodland and edge species not considered forest-dependent (Bennun *et al.* 1996).

Green Coucal *Ceuthmochares aereus* A few were heard at 800–900 m. Also reported from the foothills by Fuggles-Couchman (1939).

White-browed Coucal *Centropus superciliosus* Common in the disturbed forest at lower altitudes, and also heard at 1550 m. Not reported before, but not considered a strict forest species.

African Wood Owl *Strix woodfordii* Only heard from the camp at 960 m, but presumably present along most of the gradient. It was also reported by Stuart & van der Willigen (1978) and J. Rabøl and J. Fjeldså (pers. comm.).

Bubo species On the evening of 28 November around 19:00 I heard a deep, monotonous eagle owl hooting *ho ho ho ho ho ho* from the camp at 960 m. I assumed it to be Nduk Eagle Owl *Bubo poensis vosseleri* (the only large owl known from Eastern Arc forest types), with which I had had no previous experience. However, the voice of Nduk Eagle Owl, as described by Hunter *et al.* (1998) or Seddon *et al.* (1999) is completely different. I later heard the same call on two nights in the South Pare Mountains at 1700 m, but the identity of this owl remains unknown. Interestingly, a possible Nduk Eagle Owl has previously been reported from Ngurus (in Moreau 1964).

Narina Trogon *Apaloderma narina* Neither heard nor seen, though I am familiar with its song, so it might not be present inside Nguru South FR. Moreau (1940) reports a specimen collected from the east side of 'Nhuru' at 900 m. In 1992, J. Fjeldså and J. Rabøl (pers. comm.) recorded *A. narina* in the eastern Nguru foothills. The species is probably distributed sparsely where suitable habitat remains at low altitudes.

Bar-tailed Trogon *Apaloderma vittatum* Very common from around 1200 m. Abundance peaked at the 1550 m site, where it was the second most common species recorded. It is normally considered uncommon (Britton 1980, Brown *et al.* 1982). The population density in the Ngurus is noticeably higher than I have found elsewhere, in the Udzungwas, Ulugurus and Pares.

Trumpeter Hornbill *Bycanistes buccinator* Seen and heard, but not very common, between 800–1000 m. It seems not to have been reported previously, perhaps because of seasonal movements between different forest areas.

Silvery-cheeked Hornbill *Bycanistes brevis* Common at lower altitudes and seen as high as 1750 m.

Green Barbet *Stactolaema olivacea* Very common at lower altitudes and found up to 1800 m. An adult was seen feeding a chick at 1100 m. It is much more common here than in the Udzungwas or Ulugurus.

White-eared Barbet *Stactolaema leucotis* Not found but included in Stuart (1981). This species coexists with *S. olivacea* in the Usambara Mountains, but it normally prefers edge habitat (Fry *et al.* 1988). Not recorded by any recent surveys.

Moustached Green Tinkerbird *Pogoniulus leucomystax* Found from 1550 m, common at highest altitudes. This is a new record for the Ngurus, but the species is common in most Eastern Arc montane forests.

Yellow-rumped Tinkerbird *Pogoniulus bilineatus* Found throughout, but common only at low altitudes.

Scaly-throated Honeyguide *Indicator variegatus* A few heard and one individual seen at 1070 m and heard at 1280 m. This species was not included in Stuart (1981).

Olive Woodpecker *Mesopicos griseocephalus* Not found, but most likely overlooked. However, the only record seems to be of one individual in Stuart & van der Willigen (1978).

African Broadbill *Smithornis capensis* Sparsely present at all altitudes up to 1750 m; two birds were mist-netted. It is more common in the Udzungwas and Ulugurus than here.

Mountain Wagtail *Motacilla clara* I did not encounter this species as I did not work near larger streams. It has been recorded in other surveys, most recently by J. Fjeldså and J. Rabøl (pers. comm.), who recorded it frequently above Mhonda as well as in eastern foothills.

Black Cuckoo-shrike *Campephaga flava* Single females were seen in two different areas around 1050 m. Could be overlooked, but it is mainly a woodland species.

Grey Cuckoo-shrike *Coracina caesia* A few were seen around the 1070, 1550 and 1750 m sites. This species is easily overlooked as it is elusive and forages in the upper canopy; it is presumably not uncommon.

Shelley's Greenbul *Andropadus masukuensis* Found from 1100 m upwards, common around 1200–1500 m.

Eastern Mountain Greenbul *Andropadus nigriceps* (Restricted-range) Common from 1700 m, this was the most abundant species at the 1950 m site.

Striped-cheeked Greenbul *Andropadus milanjensis* From 1200 m upwards, but not very common. J. Fjeldså and J. Rabøl (pers. comm.) also recorded it at around 1000–1100 m. In the Udzungwas, where it is more abundant, I have seen it as low as 540 m in the breeding season. This essentially montane species is a seasonal altitudinal migrant (Burgess & Mlingwa *in press*).

Little Greenbul *Andropadus virens* Extremely common in the disturbed submontane forest, where it is easily the most abundant species. It constitutes a remarkable 30% of sight and sound records from 860 m. At 1300 m it drops out from the community completely.

Cabanis's Greenbul *Phyllastrephus cabanisi* Found from 1050 m upwards, but nowhere common.

Yellow-streaked Greenbul *Phyllastrephus flavostriatus* The third most common species at lower altitudes, found as high as 1750 m. Sclater & Moreau (1932) found it as low as 420 m.

Tiny Greenbul *Phyllastrephus debilis* Though easily detected through its characteristic song, only a few individuals of this skulker were seen and heard inside primary forest at the 1280 and 1550 m sites, while two individuals were captured at 1450 m. Moreau (1940) also reported it from 1600 m (5200 ft), while Stuart & van der Willigen (1978) found it to be common at lower altitude. It is essentially a coastal and lowland forest species, but the subspecies *albigula* is found in the Usambaras and Ngurus above 600 m (Keith *et al.* 1992). The Nguru records represent its maximum altitude.

Common Bulbul *Pycnonotus barbatus* Penetrated the disturbed forest at lowest altitudes.

Red-tailed Ant Thrush *Neocossyphus rufus* This species seems only to have been recorded by J. Rabøl and J. Fjeldså (pers. comm.), who found it in the eastern foothills of Manyangu Forest Reserve.

Olive Thrush *Turdus olivaceus* Found from 1300 m, but only common above 1800 m.

Orange Thrush *Zoothera gurneyi* I did not find this species, though familiar with its song. Stuart & van der Willigen (1978) reported *Z. gurneyi* as not

uncommon after visiting the same part of Nguru North FR, and in August 1997 D. Moyer (*in litt.*) found one singing bird at 1550 m.

White-chested Alethe *Alethe fuelleborni* Found down to 900 m, common from 1100 m and upwards, being more abundant here than in my surveys in other Eastern Arc mountains.

White-starred Robin *Pogonocichla stellata* Increasingly abundant from 1300 m upwards. At the 1950 m site it was the third most common species.

Sharpe's Akalat *Sheppardia sharpei* (Restricted-range) Also found from 1300 m upwards but only common at higher altitudes. In the Udzungwas it is sympatric with the montane Iringa Akalat *S. lowei*, and commonest at mid-altitude. Being the only akalat in the Ngurus it seems to have specialised in the montane habitat. However, it is also an altitudinal migrant to foothills in the dry season (Burgess & Mlingwa 2000), and J. Fjeldså and J. Rabøl (pers. comm.) recorded it at 1000–1100 m on the eastern Nguru slopes in October 1992.

Red-capped Robin *Cossypha natalensis* A few individuals were seen and heard singing, including imitations, at around 850–900 m. A submontane to lowland species, it is not previously recorded for the area, but reported from Kanga Mt (J. Rabøl, pers. comm.).

Evergreen Forest Warbler *Bradypterus lopezi* Common at higher altitudes, but not as dominant as in the Udzungwas. It was observed as low as 1250 m.

Kretschmer's Longbill *Macrosphenus kretschmeri* Not found. Slater & Moreau (1932) encountered it, and specimens were obtained from 420 and 1450 m, but it has not been recorded by other recent surveys. However, D. Moyer (*in litt.*) heard several individuals in forest patches between Mhonda and Ubiri in August 1997, so it is still present. It is probably sparsely distributed in suitable foothill forest habitat.

Yellow-throated Warbler *Phylloscopus ruficapillus* Found from 1200 m and common at higher altitudes.

Mountain Yellow Warbler *Chloropeta similis* Not found. The only record is that of Fuggles-Couchman (1984), who reports a female caught at 1800 m in 1937. It is a species that frequents a variety of habitats apart from primary forest, including bamboo and heathscrub (Urban *et al.* 1997). Both *Arundinaria* bamboo thickets and *Erica* heathland are found in montane parts of the Ngurus (Pócs *et al.* 1990), and *C. similis* might be found if searched for in such habitat.

Bar-throated Apalis *Apalis thoracica* Common from 1600–2000 m, uncommon from 1300–1600 m. J. Fjeldså and J. Rabøl (pers. comm.) recorded it as low as 1000–1100 m. Nguru birds are of the northeastern subspecies *murina*, but with a brighter green back than in the Usambaras (J. Fjeldså, pers. comm.).

Chapin's Apalis *Apalis chapini* (Restricted-range) Found down to 1300 m, this species is common at higher altitudes.

Black-headed Apalis *Apalis melanocephala* Common up to 1500 m, also found at 1700 m. While the songs of the Bar-throated and Chapin's Apalis are remarkably consistent throughout their range, I have found the song of this species to vary considerably within the Eastern Arc mountains. In the Ngurus, Ulugurus and Pares (all subspecies *moschi*) it is much coarser and duller than in the Udzungwas.

African Tailorbird *Artisornis metopias* (Restricted-range) A very few males heard singing at the 1550 and 1750 m sites in association with light-gaps with dense undergrowth and ferns. It was also reported by Moreau (1940). It may be common in more heterogenous montane habitats, as it is in the Udzungwas and Ulugurus.

Bleating Bush Warbler *Camaroptera brachyura* Common at lower altitudes, found even at 1550 m. It seems not to have been reported before, but it is an undergrowth rather than a strict forest species (Bennun *et al.* 1996, Urban *et al.* 1997). Its abundant presence indicates the degradation of the submontane forest. Nguru birds are a green-backed form, presumably subspecies *fugglescouchmani*.

Dusky Flycatcher *Muscicapa adusta* This montane light-gap and edge species was only seen at 1100 m, on a ridge. Also reported by Moreau (1940).

Forest Batis *Batis mixta* Common at low altitudes and found up to 1500 m.

White-tailed Crested Flycatcher *Elminia albonotata* Found from 1200 m and common at higher altitudes.

Blue-mantled Flycatcher *Trochocercus cyanomelas* A few birds were heard and seen around 800–900 m, and two were captured. It is not uncommon in the eastern foothill forests (J. Rabøl, pers. comm.).

Paradise Flycatcher *Terpsiphone viridis* Found everywhere, even at the 1950 m site. Very common at medium altitudes and at 1280 m the second most common species.

Spot-throat Modulatrix *stictigula* (Restricted-range) Common from 1500 m upwards. J. Fjeldså and J. Rabøl (pers. comm.) encountered it as low as 1000–1100 m in October 1992, but it is known to migrate altitudinally in the dry season.

Pale-breasted Illadopsis *Illadopsis rufipennis* Uncommon at 800–1100 m.

Collared Sunbird *Anthreptes collaris* A typical edge or light-gap species, recorded up to 1300 m but nowhere common. It has not been reported from the Ngurus before. A pair was observed while building a nest on an exposed ridge at 1150 m, but a few days later the nest was gone. Its presence also indicates the degradation of submontane habitat.

Banded Green Sunbird *Anthreptes rubritorques* (Vulnerable) Not found. Known only from five specimens and a few sight recordings below 1600 m and no records later than the 1950s (Collar & Stuart 1985). Always a low-density species, its continued presence is uncertain, but it was recently recorded from the adjacent Nguus in a variety of submontane forest habitats at 1280–1500 m (Seddon *et al.* 1999).

Uluguru Violet-backed Sunbird *Anthreptes neglectus* Not found in the survey. A female specimen is reported by Keith (1968), while Britton (1980) describes it as scarce in the Ngurus at 1300–1500 m. It may still be present, most likely in the remaining foothill forests. It was also recently discovered in the Nguus at 1140–1350 m (Seddon *et al.* 1999).

Olive Sunbird *Nectarinia olivacea* Arguably the most abundant single species, as in other Eastern Arc forests. Common everywhere and the commonest bird at the 1280 and 1550 m sites.

Moreau's Sunbird *Nectarinia moreaui* (previously *N. mediocris moreaui*) (Restricted-range and Near-threatened) The taxonomy of the Eastern Arc double-collared sunbirds is still disputed. The Nguru birds are of the *moreaui* form, and I follow BirdLife International (2000) who treat it as a full species. It was found as low as 1350 m, common at higher altitudes, and the most abundant species at the 1750 m site.

Yellow White-eye *Zosterops senegalensis* Common around 1200–1800 m, also found at 1950 m.

Green-headed Oriole *Oriolus chlorocephalus* Common at lower altitudes, found even at the 1550 m site.

Fülleborn's Black Boubou *Laniarius fuelleborni* (Restricted-range) Found from 1600 m up and quite common at higher altitudes, though not as abundant as I found it to be in the Udzungwas and Ulugurus. J. Fjeldså and J. Rabøl (pers. comm.) found it not uncommon as low as 1000–1100 m in October, in accordance with its record as a seasonal altitudinal migrant (Burgess & Mlingwa 2000).

Black-fronted Bush Shrike *Malaconotus nigrifrons* (previously *M. multicolor nigrifrons*) I follow Zimmerman *et al.* (1996) in treating this as a full species. It was found from 1100 m and upwards and was common around 1400–1800 m.

White-throated Nicator *Nicator gularis* Found as high as 1250 m and common below 1000 m. Stuart & van der Willigen (1978) found it even at 1400 m.

Square-tailed Drongo *Dicrurus ludwigii* Common up to 1500–1600 m, where it drops out of the bird community.

Kenrick's Starling *Poeoptera kenricki* (Restricted-range) Not found. On 24 August 1997, D. Moyer (in litt.) recorded this species for the first time in the Nguru area, at 1800 m.

Waller's Red-winged Starling *Onychognathus walleri* Uncommon from 1200 m upwards; no large flocks were observed. It seems to be less frequent here than elsewhere in the Eastern Arc.

Black-bellied Starling *Lamprotornis corruscus* Recorded by Stuart & van der Willigen (1978). Stuart (1981) includes this species as a forest dweller, though it can also be found in woodland and bush. I did not encounter it, but it is common at nearby Kanga Mt (J. Fjeldså, pers. comm.).

Dark-backed Weaver *Ploceus bicolor* Found at mid-altitudes (around 1100–1500 m), but uncommon. It is recorded as infrequent by Stuart & van der Willigen (1978).

Red-faced Crimsonwing *Cryptospiza reichenovii* Already familiar with this fast-moving, discreet species, I found it remarkably common at higher altitudes. Out of just 24 birds mistnetted at 1800 m, 15 were of this species. I found it as low as 1300 m, while J. Fjeldså and J. Rabøl (pers. comm.) caught several individuals around 1000–1100 m.

Green Twinspot *Mandingoa nitidula* Just one individual was seen, at the 1070 m site, but this quiet species was probably overlooked. It is a typical edge species that has not been reported from the area before, though J. Fjeldså and J. Rabøl (pers. comm.) in 1992 caught an individual at similar altitude.

The database of the Zoological Museum, University of Copenhagen (Burgess et al. 1998) includes a few additional forest dependent species for the Ngurus: Fischer's Greenbul *Phyllastrephus fischeri*, African Hill Babbler *Pseudoalcippe abyssinica* and Oriole Finch *Linurgus olivaceus*. However, the origins of these records are unknown.

Including these species the total list for Nguru South forests amounts to 83 species, though by no means all are forest dependent. Other observers have reported more forest edge species and forest intruders, so the number of species using the forests probably exceeds 100.

Discussion

The species composition reveals Nguru Mountains as belonging to the assembly of Eastern Arc mountains. Most of the species from the regional pool are present, including the characteristic restricted-range species such as Eastern Mountain Greenbul, Spot-throat, Sharpe's Akalat, African Tailorbird, Chapin's Apalis, Moreau's Sunbird, Fülleborn's Black Boubou and Kenrick's Starling. However, when compared to the major ranges of the Eastern Arc chain, the Udzungwa and Usambara Mountains, which lie on either side of the Ngurus, several of the rarer species are absent. Examples include Dappled Mountain Robin *Arcanator orostruthus*, Swynnerton's Robin *Swynnertonia swynnertoni*, the superspecies of *Sheppardia montana* / *lowei*, Amani Sunbird *Anthreptes pallidigaster* and Usambara Weaver *Ploceus nicolli*.

It is possible that all these species were present when the regional forest cover broke up, and the smaller forest area of minor ranges has lead to more frequent accidental extinctions among vulnerable species and resulted in somewhat impoverished avian communities (Fjeldså & Rabøl 1995, Cordeiro 1998). Further surveys into unexplored montane areas and the western parts of the Ngurus could well reveal one or more of the 'missing' species, as shown by the recent discoveries of Moustached Green Tinkerbird and Kenrick's Starling.

The current forest degradation is most likely threatening species such as Narina Trogon, Kretschmer's Longbill, Banded Green Sunbird and Uluguru Violet-backed Sunbird, all of which were sparse or unrecorded in the area during recent surveys. Some of these may well already be locally extirpated because the lowland and submontane forests they depend on are rapidly disappearing. Detailed recommendations on forest conservation are beyond the scope of this paper. However, the rich diversity reported from sporadic surveys in this range would justify more intensive efforts to conserve forest habitat in the Ngurus, especially on the lower slopes.

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Black-throated Coucal *Centropus leucogaster*: a first record for East Africa

Whilst researching the recently published 'Where to watch birds in Uganda' in Semliki National Park, Uganda ($0^{\circ}52' N$, $30^{\circ}05' E$) from 28–31 May 1998, we recorded an addition to the East African avifauna, the Black-throated Coucal *Centropus leucogaster*. The richness of the forest in Semliki NP (formerly known as the 'Bwamba lowlands') is well recognised, the park having produced several new birds for East Africa in recent years (Ash *et al.* 1991, Dranzoa 1994). Interestingly, *C. leucogaster* was not included on a list of eastern Ituri Forest birds likely be recorded in western Uganda (Ash *et al.* 1991).

The bird was seen well by all members of our party, which included, in addition to the authors, Adam Riley, Sherran Rossouw, Malcolm Wilson and Katie Brett.

Details of the record have been submitted to the East African Rarities Committee for ratification.

The sighting

On 29 May at 15:00, in an area of *Cynometra*-dominant forest c. 1 km after the first crossing of the Kirumia River on the 'Kirumia Trail' to the Semliki River, JR and MW heard unfamiliar coucal vocalisations (two birds singing in a 'duet' — see Voice, below). The call was reminiscent of both Blue-headed Coucal *Centropus monachus* and White-browed Coucal *Centropus superciliosus*, two species with which all the observers are extremely familiar. The song was tape-recorded by JR and used to attract the bird into view. During the brief initial encounter, we noted the large size, barring on the rump and apparent fine, pale streaking on the black head and mantle. The bird was tentatively identified as Black-throated Coucal and the remainder of the observers assembled for observation. Further playback of the calls attracted the individual into the open crown of a low palm, where the heavy bill, red iris, black throat and buff underparts were noted, all observers enjoying unobstructed views of the bird perched at a range of less than 6 m for c. 20 s. Finally, it flew low overhead, allowing a clear view of the underparts. The following day, we recorded at least three different 'pairs' singing in forest areas adjacent to the oxbow lake, and these were also heard on 31 May. We had also heard a coucal, probably of this species, on 28 May.

Description of the bird

Large, bulky coucal with heavy bill and tail.

Bare parts — bill black, colour of feet not noted, iris red.

Upperparts — crown, nape, sides of head and mantle wholly black, with what appeared to be fine, pale shaft streaks. Closed wing unmarked chestnut, rump black barred with chestnut, tail black.

Underparts — chin, throat and chest black. Remainder of underparts buffy, grading from rich cinnamon on the upper breast to pale buff on lower belly and vent.

The presence of pale, shaft streaks on the head and mantle initially led us to believe that the bird was an immature, this being a feature of immature *C. leucogaster*. However, the absence of dark barring on the wing suggested that the bird was, indeed, an adult, with the pale shaft-streaking merely an illusion created by shiny feather shafts (D. Willard *pers. comm.*). One of us (JL) was able to confirm this with skins of *C. leucogaster* examined at Tring.

Contra Fry *et al.* (1988), the colour on the breast, belly and flanks was not richer on the belly but rather brighter on the upper breast, grading to paler on the belly and vent. This is in keeping with specimens of *C. leucogaster* in museums in Chicago and Tervuren (M. Louette *pers. comm.*, D. Willard *pers. comm.*).

Description of the song

Two different song types (A and B) were recorded, both of approximately 4 s duration. Type A was a single series of 9–12 extremely deep, booming hoots that commenced on the same pitch, then descended in pitch and slowed in tempo towards the end. Type B was a higher-pitched series of 11–15 hoots that descended and then ascended in pitch. Two birds were usually heard singing together, one using Type A and the other Type B (never both using Type A or both using Type B). One bird always led the other in the 'duet'; the lead could be either Type A or Type B. The individual that responded to tape playback sang the Type A song and was also seen the following day delivering this song unprompted by playback. The individual that sang Type B was never seen.

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Massive numbers of flamingos at Lake Logipi, November 1998

On 5 November 1998 we left the village of Tuum (02°09' N, 36°47' E) to ascend the eastern slope of Mt Njiru, a crystalline massif 35 km south of lake Turkana. From a viewpoint at an altitude of about 2100 m we obtained a clear view of Lake Logipi (also known as Namakat), an alkaline lake in the middle of the Suguta valley 30 km west of our position. The lake appeared to cover a much larger area than usual, owing to the heavy rains of the previous months. We estimated that it extended over a surface of about 35 km² (Figure 1). To the unaided eye it had a pinkish tinge that immediately reminded us of other Rift Valley lakes such as Nakuru and Bogoria. Observing with 10 x binoculars, we confirmed that the pink colour was due to huge numbers of flamingos, the majority of which were probably Lesser Flamingo *Phoeniconaias minor*.

From our field observations and photographs we estimated that about 5 km of shore, comprising a large portion of the northern end of the lake and of the small Naperito Island, had a continuous belt of birds 20–50 m wide. Additionally, at least 5 km² of the lake, again in its northern section, were covered by uncountable tiny pink spots (Figure 1). Other smaller flocks of flamingos were scattered over most of the surface. We estimated that at least 500,000 flamingos were present.

Both Lesser Flamingo and Greater Flamingo *Phoenicopterus ruber* are known to occur in considerable numbers at Lakes Turkana and Logipi (Schekkerman & van Wetten 1987, Bennun & Fasola 1996), where both species have also been reported to nest (Chambers 1960, Lewis & Pomeroy 1989). Our observation, however, outnumbers all previous ones by far and is particularly interesting since populations of Lesser Flamingos in the southern Rift Valley lakes are thought to have greatly declined in the 1990s (Nasirwa 1997). Lake Logipi is clearly an important feeding and perhaps breeding area for Lesser Flamingo in the Rift Valley, at least when particular

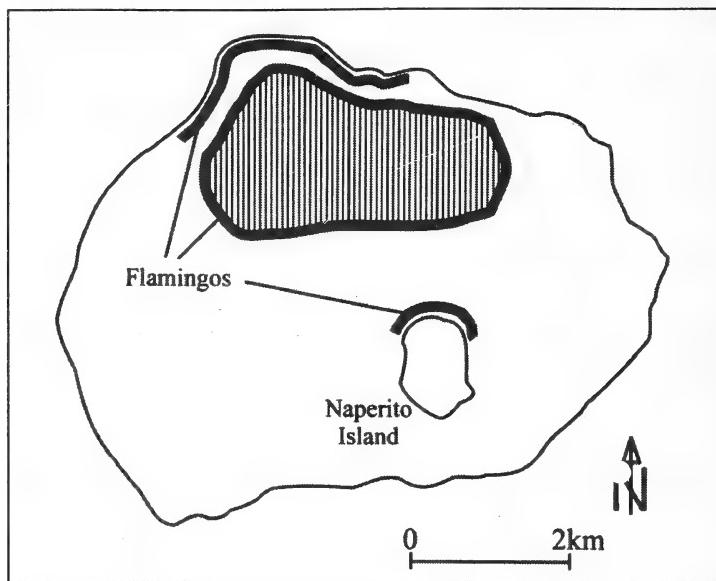


Figure 1. Lake Logipi (redrawn from Survey of Kenya map 1:100,000, series Y633, sheet 53 (Ng'iro)) showing the distribution of flamingos on 5 November 1998

climatic conditions (i.e. heavy rains) occur. Logipi appears highly seasonal and may fill or dry rapidly; C. Tuite (via O. Nasirwa, *in litt.*) reports mass mortality of flamingos at Lake Logipi during the 1970s. He speculates that birds in poor condition, feeding on diatoms and rotifers in the absence of *Spirulina*, were stranded when the lake suddenly dried.

Acquiring more information over a longer period of time on the presence of flamingos in this area may be of considerable importance for understanding the movements and ecology of these species in Kenya.

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Contact call of the Stripe-breasted Tit *Parus fasciiventer*

The Stripe-breasted Tit *Parus fasciiventer* is a restricted-range species of the Albertine Rift Mountains Endemic Bird Area (Stattersfield *et al.* 1998), described as common to locally abundant in the montane forests of SW Uganda (Harrap & Quinn 1996). In a detailed description of the species' vocalisations, Harrap & Quinn (1996) note that its main calls are a variation on "a 'chick-a-dee'-type vocalisation recalling both black and grey tits", but that the species is generally "rather silent".

During 12 days spent at Ruhija, Bwindi Impenetrable Forest, SW Uganda, in October 1998, I encountered groups of Stripe-breasted Tits on 24 occasions. Although initial observations tended to support the view that the species is rather silent, it became apparent that whilst feeding most birds were in fact quite vocal, but gave a call unlike those described by Harrap and Quinn. The most frequent call heard was a soft, unobtrusive *whit* or *whip*, which differed markedly from the species' other, more stridently tit-like, calls. Although subdued, the *whit* call could readily be picked-out from amidst mixed-species flocks, often 2–3 minutes before the caller was finally located.

On three occasions the call rate was measured, for birds in groups of 1–3, over periods of 6–14 min. The *whit* call was given at rate of approximately 2–3 calls/bird/min, and on one occasion was interspersed with a more typically tit-like *chit-chit-char-char* call, the latter at a rate of 0.5 calls/bird/min. Nonetheless, during most of the 24 encounters only the *whit* call was heard, usually throughout each encounter. My impression, therefore, is that this is the species' main contact call, and that, far from being 'rather silent', feeding Stripe-breasted Tits call frequently, but unobtrusively.

Acknowledgements

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A breeding record and behavioural observation of African Green Broadbill *Pseudocalyptomena graueri* in south-western Uganda

The African Green Broadbill *Pseudocalyptomena graueri* is restricted to montane forests west of Lake Kivu, the Itombwe Mountains in eastern Democratic Republic of Congo, and Bwindi Impenetrable Forest, south-western Uganda. In Bwindi it is reported as rare (Lambert & Woodcock 1996). As with many African forest species, little is known about its biology. Information about breeding activity is restricted to a description of an active nest (no eggs described) found in Bwindi in April, and the collection of adult birds with swollen gonads and an immature bird during late July (Keith *et al.* 1992). BirdLife International (2000) list this species as Vulnerable.

An adult African Green Broadbill was found perching in a *Tabernaemontana holstii* tree, about 5 m above steeply sloping ground, on 28 March 1998 in Bwindi Impenetrable National Park. An individual of this species had been seen in the same location (on the edge of a belt of *Chrysophyllum gorungosanum* forest) on two occasions within the same week (J. & S. Rossouw and M. Sacchi, pers. comm.). The bird moved little at first, but after about 10 minutes started foraging in the mid-storey, collecting a fruit of about 8 mm in diameter which was carried and fed to a second bird. The second bird lacked any buff colouration on the crown or blue on the throat and vent, but was entirely green with extensive yellow on the bill and a slightly browner wing panel. This fits the published descriptions for

immature birds. Throughout this observation the immature gave a constant high pitched *see see see see* call, a vocalisation also made by adult birds (T. Butynski, pers. comm.).

The calling immature flew to a different location where the adult approached with another similar fruit. Over the next few minutes the adult presented this fruit three times to the immature, but it was not taken. Eventually the adult moved away. Almost immediately a second adult approached the immature, carrying a small moth which was quickly taken and eaten. The first adult, still carrying its fruit, flew into the herbaceous undergrowth. There was an immediate burst of calling from another immature in the undergrowth, after which the adult flew up into the mid-storey, no longer carrying the fruit. This second immature was fed again with a moth gleaned by an adult from the underside of a leaf.

This observation demonstrates the wide range of breeding times for this species. Late March is normally the beginning of the long rainy season in Bwindi, though climatic patterns were abnormal in 1998 with unusually high rainfall in January and February. This observation implies a breeding time much earlier than the published records outlined above. It is unknown for how long these two young birds had been out of the nest. The first immature was flying competently and was structurally identical to the adults. Some tropical forest passerines are noted for their long period of post-fledging parental dependence (Fogden 1972). In Sarawak, Fogden (1972) found Banded Broadbills *Eurylaimus javanicus* still feeding their young after five months.

It is noteworthy that this species appears to have successfully reared two offspring to the fledgling stage. There is no description of the clutch size from the nest described in Keith *et al.* (1992) for this species, but we now know it must be at least two, which is typical of Afrotropical forest birds. Grey-headed and Red-sided Broadbills *Smithornis sharpei* and *S. rufolateralis* lay one or two eggs, and the more widespread African Broadbill *S. capensis* one to three eggs (Keith *et al.* 1992).

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Grey-olive Greenbuls *Phyllastrephus cerviniventris* in and near Meru National Park

Although Meru was included in the Kenyan range of Grey-olive Greenbul *Phyllastrephus cerviniventris* by Keith *et al.* (1992), more recently the species has been considered to occur no further north in Kenya than Thika (Zimmerman *et al.* 1996).

On 20 February 1999 I saw a single Grey-olive Greenbul at Kindani River Camp, just outside the western boundary of Meru National Park, 13 km south-west of the Murera Gate. On 22 February 1999, two birds were present at the same site. There have since been further records from the area. At Kampi ya Nyati, a single bird was seen on 2 October 1999; several birds were present there in March 2000 (Brian Finch, pers. comm.); and MM and Jeffrey James (JJ) found a small group there on 8 April 2000. Kampi ya Nyati is just inside Meru National Park, 5–10 km south of Kindani River Camp. On 8 April 2000, at least 5 birds were present close to the Ura River Gate into Meru National Park, some 23 km south of Kindani River Camp.

It seemed possible that these birds might be attributable to the putative subspecies *P. c. lonnbergi*, described from a single specimen taken by Mearns in 1922 from Tharaka district and now in the Smithsonian Museum (Zimmerman *et al.* 1996, and D. A. Turner (DAT) *in litt.*). During 10–13 March 2000, a party from the Nairobi Ringing Group, as well as MM and JJ, carried out several mist-netting sessions at Kindani River Camp which resulted in the capture of nine Grey-olive Greenbuls. Several photographs, as well as measurements and descriptions, were taken. The photographs were examined by DAT who concluded that the Meru birds did not differ from birds found further south in Kenya. Based on my own field experience of Grey-olive Greenbuls around Thika, I concur with this view. The validity of *lonnbergi* (which was not recognised by Keith *et al.* 1992) is therefore in doubt. DAT did however comment on the eye colour shown by the birds in the photographs. In the descriptions taken of adult birds, this was creamy-orange or pale yellowish around the pupil, becoming richer orange towards the rim. In some birds this gave the impression of a distinct bright orange

eye rim, a feature not mentioned by Keith *et al.* (1992). A juvenile bird had a pale cream-grey eye.

Grey-olive Greenbuls have been found recently in the Nairobi Arboretum (Nalianya 2000), in Nairobi National Park (Jackson 1997), in the grounds of the Windsor Golf and Country Club and in Kiambu (Turner 1993, Pearson & Turner 1998), as well as 25 km east of Thika (pers. obs.). The species is also listed by Burrell (1999) as occurring near Embu town, roughly mid-way between Thika and Meru. It is therefore possible, even probable, that the species still occurs in suitable habitat from Nairobi through to the western and south-western edge of Meru National Park.

All the birds seen in 1999 and 2000 in and near Meru National Park were in dense riverine thickets with plenty of trees, similar to the habitat used in the Thika area. Although much of the land between Nairobi and Meru National Park is intensively cultivated, the species appears able to survive in quite narrow stretches of riverine thicket (pers. ob.), a habitat that may well remain throughout much of its possible central Kenyan range. Once its call (a nasal zer-zer-zer-zer-zer) and habitat preference are known, the species is not hard to locate. The limited numbers of records in central Kenya may therefore be due to limited observer activity.

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Some range extensions of birds in northern Tanzania

During October 1998 I visited various localities in northern Tanzania and compiled bird lists for the Tanzania Bird Atlas Project. Several of the records represent new and significant range extensions.

Details of localities where only one significant sighting was made are given under the relevant species heading. Extended observations were made at the following three localities:

Capri Point, Mwanza 2°31' S, 32°53' E, altitude 1203 m. A rocky prominence extending westwards into Lake Victoria. It is characterised by large granite domes and boulders and there are well-developed gardens around the older houses on the lower slopes. Daily observations were made on 9–15, 21 and 27 October 1998.

Mwamazengu, east of Smith Sound 3°08' S, 32°51' E, altitude 1230 m. The area features parallel, north-south aligned ridges, separated by flat valleys modified by shifting cultivation and grazed by cattle and goats. The ridges support a dense woodland dominated by *Julbernadia globiflora*. Observations were made over two days on 22–23 October 1998.

Kukulema, Geita Forest Reserve 2°48' S, 32°16' E, altitude 1610 m. Tall gallery forest in mature *Brachystegia/Julbernadia* woodland. Observations extended over three consecutive days, 24–26 October 1998.

Species names follow Zimmerman *et al.* (1996).

African Barred Owlet *Glaucidium capense* Two adults with a flying juvenile were encountered in gallery forest at Kukulema on 26 October 1998. They were flushed in the understorey in the early afternoon, but permitted a close approach. The adults both called to the juvenile, and all were clearly viewed at distances of a few metres. The birds did not appear to belong to the coastal race *G. c. scheffleri*, or to other equatorial races of this species, as they had whitish eyebrows and lacked any rufous wash on the underparts. Kukulema is the most northerly locality for this species in Tanzania and the only atlas record in a block of 18 one-degree squares lying between 2–8° S and 31–34° E. Of the previous 93 records for Tanzania, 75 are in the south-eastern quadrant of the country.

Half-collared Kingfisher *Alcedo semitorquata* Grumeti River, Serengeti National Park, 16 October 1998. The bird was seen from the suspended walkway over the river near the western corridor section of the park. My attention was attracted by its familiar high-pitched call, and I then saw it perched on an exposed root of a bank-side tree before it flew off down river. The habitat along this section of the Grumeti River appeared ideal for this species, being relatively narrow with well-wooded banks and lots of dry branches and roots overhanging the water. Of the five previous Tanzania

atlas records from localities north of 5° S, one was in November, three in December and one in June.

Grey-winged Robin-Chat *Cossypha polioptera* The common robin of the gallery forests at Kukulema. The type locality of this species is Bukoba, on the western shore of Lake Victoria, and recent distribution records are all from the Bukoba District. This record therefore extends the Tanzanian range of the species south-eastwards.

Blue-headed Crested Flycatcher *Trochocercus nitens* Like the Grey-winged Robin-Chat, this flycatcher has a largely West African distribution and has previously been recorded only from a small area in north-west Tanzania. A pair was observed at close quarters in the understory of gallery forest at Kukulema.

Ashy Starling *Cosmopsarus unicolor* A pair of these birds was observed at Mwamazengu. Zimmerman *et al.* (1996) state that this species is not very vocal, but my attention was attracted to them by their loud (and unfamiliar) calls, an exchange of skirling whistles, issuing from the top of a large, isolated tree in the patchwork of shifting cultivation. This record extends the known range of this Tanzanian endemic north-westwards.

Magpie Starling *Speculipastor bicolor* Kikuletwa River area. Three birds seen (with Neil and Liz Baker) in the late afternoon of 31 October 1998, perched on a tree in open *Acacia* bushland on the south bank of the Kikuletwa River south-west of Moshi at 3°28' S 37°10' E, close to the foothills of the Lelatema Mountains. Our first impression was of Violet-backed Starlings *Cinnyricinclus leucogaster*, but when they took flight at our approach the white wing patches revealed their true identity. There are only two previous records of this species for Tanzania; both involved flocks in the western foothills of the North Pare and South Pare Mountains (Britton 1980).

Orange Weaver *Ploceus aurantius* Capri Point, Mwanza. Identification was based on in-hand examination of five birds mist-netted on 14–15 October. All were in female or equivalent subadult plumage. No males of this species were seen at any time. Wing measurements and weights (minimum, mean, maximum) were 65.0, 67.4, 70.0 mm and 19.0, 19.4, 20.0 g. Total length varied from 130 to 140 mm; wing feathers were prominently edged with yellow, bills were pale brown and iris colour was brownish grey (3) or pure grey (2). Other common weavers in the area were the Village Weaver *Ploceus cucullatus* (a netted female had a wing of 82 mm and weighed 32 g), Slender-billed Weaver *P. pelzelni* and Yellow-backed Weaver *P. melanocephalus*. Orange Weavers have been reliably recorded from the Ugandan shores of Lake Victoria and from lakeside habitat near Bukoba in north-western Tanzania (Britton 1980). Their presence at Mwanza represents a southerly (and possibly seasonal) extension of range in Tanzania.

Olive-headed Weaver *Ploceus olivaceiceps* A pair of these birds was observed foraging in scattered small trees in an area of open woodland on a ridge at Mwamazengu on 22 October 1998. They were kept under observation for several minutes and good views were obtained of both the male and the female. These were green-backed birds like the southern *P. o. olivaceus*. The species has not previously been recorded so far north in Tanzania, but this may well be because the ornithology of the region from south-western Lake Victoria to about 6° S is not well known. Observers who have the opportunity to travel in this region should keep a lookout for this species, especially in *Brachystegia/Julbernadia* woodland habitats.

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Neil and Liz Baker are thanked for their friendly hospitality and for showing me some of their local avifauna. Neil Baker picked out the significant sightings from my Tanzanian bird lists and commented on an earlier draft of this note. Michael Skead facilitated my visits to Mwamazengu and Kukulema by providing transport and overnight accommodation. Finally, my special thanks to my daughter Ruth, whose aerial photographs of the Kukulema gallery forests enticed me to Tanzania.

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Recent sightings of Purple Swamphen *Porphyrio porphyrio* and some other uncommon intra-African migrants in Khartoum

The Purple Swamphen *Porphyrio porphyrio* has rarely been recorded in The Sudan. Nikolaus (1987) states "only one recent record from Kosti...with unknown status (F. Lambert)". Urban *et al.* (1986) presumably refer to the same occurrence when they say, "...one record for Sudan, at Kosti (G. Richardson, F. Lambert, fide P.B. Taylor)."

During 1998 and 1999 I saw a number of Purple Swamphens in Khartoum (15°36' N, 32°31' E) on the east bank of the White Nile, about 2.5 km south of

its confluence with the Blue Nile. This is part of an area that is subject to extensive flooding, especially during the period August to November. The area has not been developed, even though it covers approximately 3 km² and is close to the city centre. The river bank is partially cultivated, using both flood water and mechanical irrigation. It is also used for pasturing cattle, sheep and goats. The Sunt Forest, with *Acacia nilotica*, lies immediately beyond the cultivated bank and extends back to a main road and the suburb of Mogran.

In addition to the major rise in the level of the river in the latter part of the year, there is also a much smaller rise during the period April to May. In 1998 and 1999 this caused flooding to some of the lower lying parts of the river bank. It was during these periods that Purple Swamphens were seen in one of the flooded, cultivated areas, which extended back for about 500 m from the river's edge to the Sunt Forest. The rise in the level of the river was greater in 1998, and there was also a well-grown crop of sorghum in the flooded area, which provided suitable refuge for the birds.

In 1998 the bank had started to flood shortly before 25 April. By 22 May the river had subsided and only a few small pools remained. Purple Swamphens were seen on 1 May (6 adults in the morning and at least 16 adults and 1 immature in the afternoon), 8 May (1 adult), 15 May (5 adults and 1 immature), 22 May (1 adult and 2 immatures in the morning, and 10, including adults and immatures, in the early evening).

In 1999 the bank had started to flood by 9 April. By 21 May only a few small pools remained. Purple Swamphens were first seen on 16 April (2 adults observed flying low over the river close to the bank, and settling on some low islets), and then on 14 May (between 5 and 9 adults were disturbed from clumps of thick grass).

Though I had not seen this species before, there could be no doubt about identification. However, it was not until I obtained a fairly close view, on 22 May 1998, that their moss green backs and wings were clearly seen, so identifying them as the sub-species *madagascariensis*. This sub-species would be expected here as it occurs along the Nile in Egypt to the north and Uganda to the south. Of the two immature birds seen on 22 May 1998, one was entirely grey-plumaged, the other grey above with a white breast and belly. The birds were mostly seen at a distance, when they were walking along the irrigation ridges between the river and the thick vegetation in which they took refuge. They did not seem particularly wary, and on one occasion a group of four were observed at the edge of the river, within about 20 m of two groups of fishermen. Normally I visited this area once a week in the morning. On the two occasions when I also went in the afternoon and evening, the number of birds seen was considerably higher.

During approximately the same periods that the Purple Swamphens were present, I saw several other intra-African migrants in the same area. Some of these have been infrequently recorded in Khartoum or Sudan:

African Spoonbill *Platalea alba* were seen on 25 June (1 adult and 1 juvenile feeding in the river shallows) and 9 July 1999 (5 adults on flooded river bank).

Hottentot Teal *Anas hottentota* were seen on 22 May 1998 (2 resting by small pool on river bank), and on 23 April (about 20 in groups of 4–6 on flooded river bank), 30 April (2 on flooded river bank) and 7 May 1999 (5 on flooded river bank).

Spur-winged Goose *Plectropterus gambensis* were present from 24 January 1998 to at least 29 May 1998, when I estimated there were over 2,000 roosting on Umm Shugeira Island. This island lies in the middle of the White Nile opposite the site where I saw the Purple Swamphens. In 1999 they were first observed on 23 April and were still present on 9 July. The maximum number estimated in 1999 was about 1000 on 21 May, also on Umm Shugeira Island.

Lesser Jacana *Microparra capensis* were seen on 22 May 1998 (1 was flushed from the edge of an irrigation ditch), and on 7, 14 and 21 May 1999 (up to 2 birds)

Painted Snipe *Rostratula benghalensis* were seen on 22 May 1998 (3), and on 7, 14 and 21 May, and 3, 11 and 25 June 1999 (maximum of 22 on 21 May)

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1986. *The birds of Africa*. Vol. 2. London:
Academic Press.

Both English and scientific names of birds should be given when the species is first mentioned — in the title and in the text — thereafter, only one name should be used.

Bird names should be those of a stated work. Any deviations from this work should be noted and the reasons given.

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Contents

LUCA BORGHEZIO AND PAUL KARIUKI NDANG'ANG'A. An avifaunal survey of Mt Kulal, Kenya	1
MORTEN DEHN AND LARS CHRISTIANSEN. Comments on the occurrence of 15 Albertine Rift endemic bird species in the Rwenzori Mountains National Park, Western Uganda	13
MUCHANE MUCHAI, LEON BENNUN AND LUC LENS. Notes on the behaviour and ecology of Sharpe's Longclaw <i>Macronyx sharpei</i> , a threatened Kenyan grassland endemic	23
MORTEN DEHN AND LARS CHRISTIANSEN. Altitudinal distributions of congeneric montane forest bird species along an elevational gradient in the Rwenzori Mountains National Park, western Uganda	29
NORBERT J. CORDEIRO AND MWANGI GITHIRU. Birds of Mgambo Proposed Forest Reserve and other East Usambara lowland sites	37
TOM S. ROMDAL An ornithological survey of the Nguru Mountains, Tanzania	49

Short communications

JONATHAN ROSSOUW AND JEREMY LINDSELL. Black-throated Coucal <i>Centropus leucogaster</i> : a first record for East Africa	63
LUCA BORGHEZIO AND PAUL KARIUKI NDANG'ANG'A. Massive numbers of flamingos at Lake Logipi, November 1998	65
PHIL SHAW. Contact call of the Stripe-breasted Tit <i>Parus fasciiventer</i>	67
J.A. LINDSELL. A breeding record and behavioural observation of African Green Broadbill <i>Pseudocalyptomena graueri</i> in south-western Uganda	68
M. MALLALIEU. Grey-olive Greenbuls <i>Phyllastrephus cerviniventris</i> in and near Meru National Park	70
T.B. OATLEY. Some range extensions of birds in northern Tanzania	72
EDWARD HALL. Recent sightings of Purple Swamphen <i>Porphyrio porphyrio</i> and some other uncommon intra-African migrants in Khartoum	74

